ENGINEERING AND MINING JOURNAL

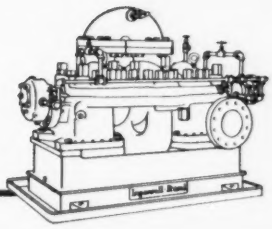
A McGRAW-HILL PUBLICATION

OCTOBER, 1949

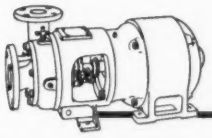
Abrasion-resisting steel in chutes and elsewhere cuts costs at Hill-Annex washing plant on Mesabi range—Page 86

Rope Testers Reveal Causes of Wear and Failure — Page 72

HYDROSEALS
ACROSS
THE BOARD
WIN—Hydroseal Pumps "win" new friends every time they are put in service. And the friends last, as proved by the large number of repeat orders, extending over many years or embracing several mines of customers.
PLACE—No matter where you "place" Hydroseals, if we sell them to you for that service, you can feel assured that they will do a good job even under toughest conditions.
SHOW—Savings in power and maintenance "show" as soon as Hydroseals are put in service. Also, our engineers will plan an entire pumping system for you, if desired, even including automatic controls as required.
P. S.—There is no risk or gamble with Hydroseals. When you place your bet, you're sure to win. Send for our catalog, or write us describing your "problem pumping."
THE ALLEN-SHERMAN-HOFF CO.
229 S. 15th Street, Philadelphia 2, Pa., U. S. A.
REPRESENTATIVES IN MOST PRINCIPAL CITIES

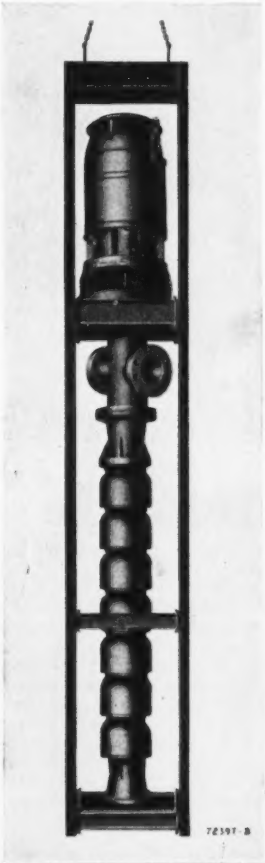


For Centralized



or Decentralized

Mine Drainage Systems



Keeping mines free from water is a tough job calling for thoroughly reliable pumps. That's why you'll find so many Ingersoll-Rand pumps serving in mines throughout the world.

No matter what the type of drainage system—centralized, decentralized, or a combination of both—there's a correct size and type of I-R pump. They are constructed of the proper materials, corrosion resistant where necessary, to give the dependable trouble-free service you require.

Call upon the Ingersoll-Rand pump engineer near you to help you with your pump problems. He'll be glad to explain the important features of I-R mine pumps for dewatering and for the various other mine, mill, and smelter applications.

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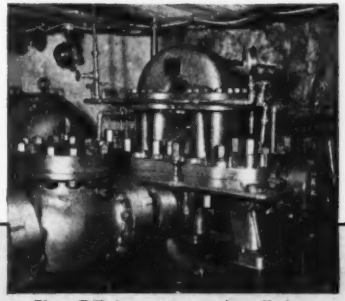
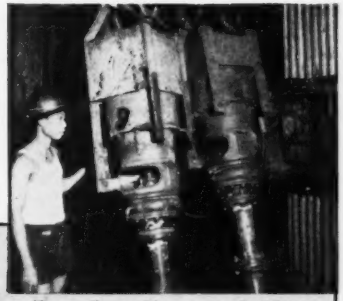


Class RT 6-stage pump installed on the 17th level of a silver-lead mine.



Two sling-yoke mounted Motor-pumps being used for sinker service.

Vertical drainage or dewatering pump mounted on guide rails.

First step toward an automobile

A typical example of B.F.Goodrich product improvement

THAT picture, taken 1200 feet underground, shows iron ore that in a few weeks will become a steel automobile body. The moving belt collects the iron ore (often in chunks too big for any man to lift) and carries it up and out — cheaper, faster than the old car-and-locomotive method.

But the belts take a terrific beating — iron ore is not only heavy but lumps also have sharp, cutting edges. Repairs to belts that far underground would be costly, almost impossible. The mine superintendent who decided on this belt chose B.F.Goodrich because of this company's long history of making belts for "impossible" jobs.

BFG engineers developed a belt to meet these harsh conditions, with extra thick, cushioning cover. It has already been running a year with no slightest sign of wear. Miners and owners both prefer it over old methods, and cost of mining is the lowest that mine ever knew.

Reducing costs for business is our business. B.F.Goodrich improvements in products have resulted in V belts which outlast previous belts 2 and even 3 times, rubber linings which reduce the cost of handling acid and at the same time protect workers from injury, hose which reduces cost of drilling oil wells because it lasts so much longer — and hundreds of other product improvements which have benefited every industry. For latest cost-saving ideas in rubber, call your B.F.Goodrich distributor or write *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY

ENGINEERING AND MINING JOURNAL

FOUNDED 1866

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IN A CLASS BY ITSELF

for 4 good reasons

New HAZACORD MINING DRILL CORD

*ZBF
ZINC BORATE FORMULA
Flame tests have shown that Zinc Borate imparts greatly increased fire-resistant properties to neoprene compounds with burning rates reduced by as much as 20% and weight losses by as much as 40%. Afterglow is materially reduced also. Millions of feet of cable protected by this type of sheath were used during the war by the Navy for special operating conditions to gain extra fire protection. Hazaprene ZBF Sheaths mean not only greater safety because of unusual flame-resistance and lack of afterglow — but also longer life through increased resistance to abrasion, wear and tear.
HAZACORD MINING DRILL

FOR TIME-SAVING, COST-SAVING CONTROL CIRCUITS WITHOUT CONDUIT, the thick, reinforced Hazaprene ZBF Sheath of this new cord assures ample protection.

SAFETY: This new drill cord is protected with an extra thickness of Hazaprene ZBF* Sheath providing flame-resistance to a degree never before attained in mining cable. And when you add these facts: that neoprene treated, glass-cord strength members are used . . . that Okobestoprene Tape (made of asbestos fibres and neoprene) wraps the interior cable assembly — you see why Hazacord Special Mine Drill Cord is by far the *safest* you can purchase.

DURABILITY: In addition to the high flame-resistance gained, more protection against mechanical damage is also provided by the extra thickness and the unusual toughness of this *mold-cured* Hazaprene ZBF Sheath, absorbing without damage heavy blows from mining equipment, lumps of coal or rock. Its abrasion-resistance and high tensile strength successfully withstand sharp edges, dragging and pulling. The neoprene sheath is unaffected by moisture, oil, acids, sunlight. The glass-cord fillers add to Hazacord's pulling strength . . . prevent moisture-absorption through cable ends. You'll get *more trouble-free service* from this cord than you ever thought possible.

FLEXIBILITY: Along with its toughness and safety features, you'll find Hazacord Special Drill Cord has extreme flexibility to assure good working qualities.

MEETS OFFICIAL REQUIREMENTS: Hazacord Mining Drill Cord more than meets the flame-test requirements of the State of Pennsylvania and U. S. Bureau of Mines and is so certified by App. No. P-104 BM molded in the sheath at frequent intervals.

It will pay you to get full information about the new Hazacord Mining Drill Cord today. Ask your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD

insulated wires and cables for every mining use

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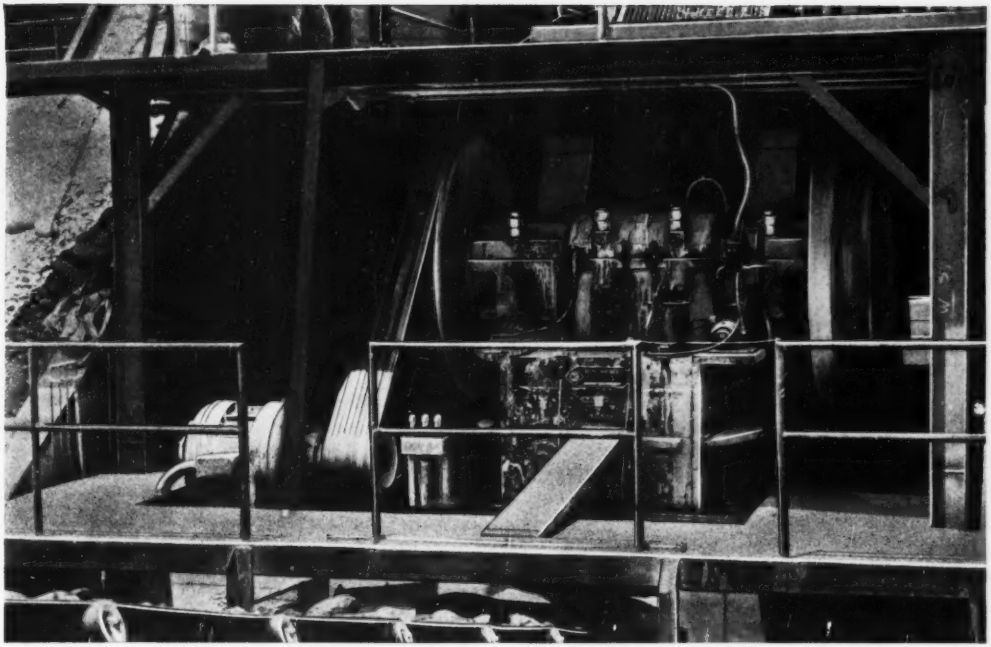

Azusa Rock & Sand Co. Cuts Costs with "*A-1*" Jaw Crusher

CALLED "ONE OF THE most efficient crushing plants in the country," Azusa Rock & Sand Co. of California installed this 42x32 in. "*A-1*" jaw crusher to break gravel boulders, some as large as 30 inches. Feed runs 100 to 200 TPH; sometimes as high as 250 TPH.

Heavy-going demands like this have been everyday routine, six days a week, for this Allis-Chalmers machine since 1946. Yet, the original main bearings are still going strong. Operation has been practically trouble-free. Only jaw plates and toggle bearings have been replaced.

MANPOWER ECONOMY

Convenient all-electric controls regulate feeder, crusher and belt conveyor to surge pile. All controls are sequence interlocked. Only one operator is needed.

CHECK THESE "A-1" FEATURES

- No choking or packing in the "*A-1*" jaw crusher — crushing is uniformly distributed throughout the entire depth of the crushing chamber.
- Jaw opening nips biggest pieces with minimum slippage.
- Renewable parts protect expensive castings from wear, greatly prolong crusher life.
- Automatic lubrication of main pitman and swing jaw bearings.

Find out more about "*A-1*" jaw crushers and other Allis-Chalmers crushers from the A-C representative in your area. Or write for **Bulletin 07B6369A.** Allis-Chalmers offices or distributors are in principal cities in the U.S.A. and throughout the world.

A-2817

ALLIS-CHALMERS, 969A SO. 70 ST.
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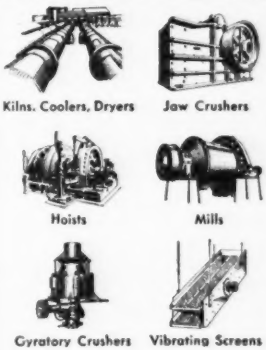
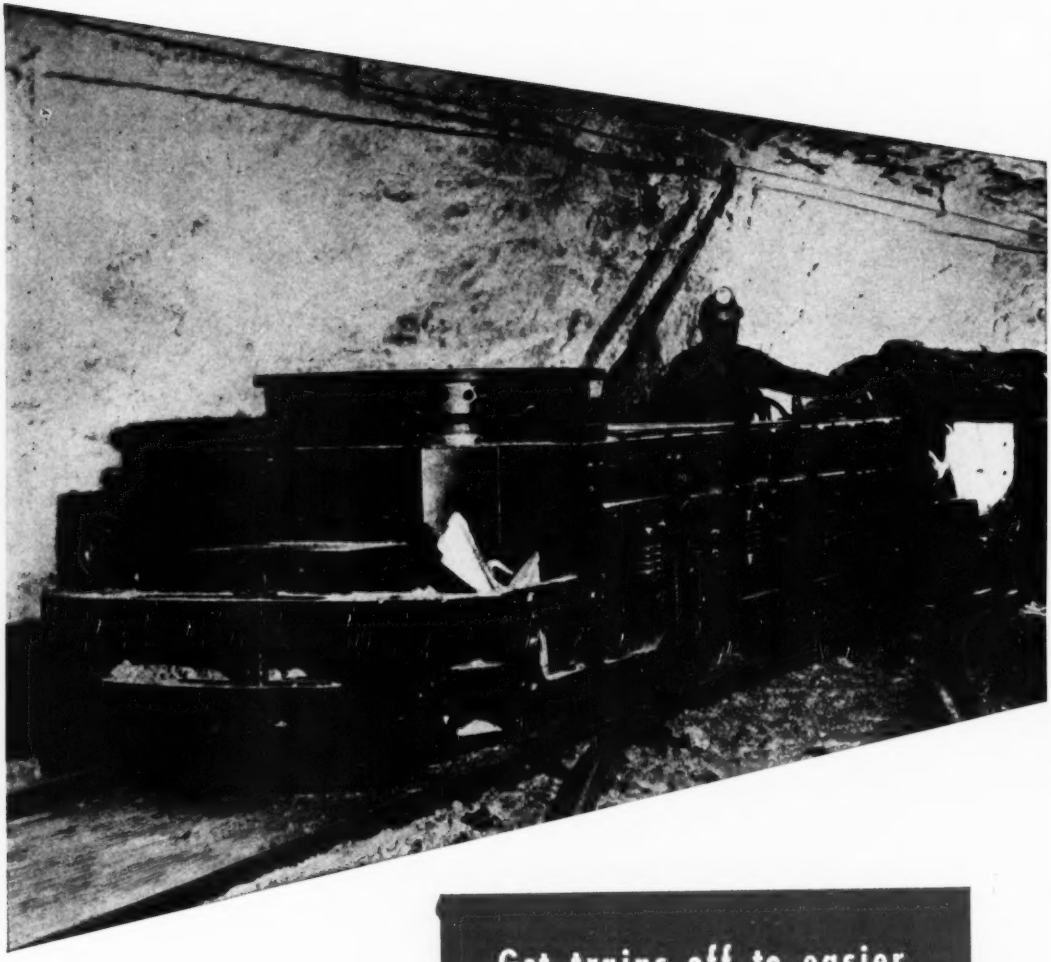
"*A-1*" is an Allis-Chalmers trademark.



AND OTHER EQUIPMENT FOR THE CRUSHING, CEMENT AND MINING INDUSTRIES

ALLIS-CHALMERS



Get trains off to easier, faster starts by lubricating car wheel bearings with Texaco Olympian Grease

TEXACO

TEXACO

Move more tonnage per shift

Texaco Olympian Grease in your car wheel bearings . . . plain, cavity hub or anti-friction . . . protects the bearings against wear and reduces starting "drag" – even in cold weather. Thus, trains get off to easier starts, make faster trips, move more tonnage per shift.

Texaco Olympian Grease resists oxidation, separation and leakage. It stays in the bearings under all operating conditions. It seals out dirt and moisture . . . guards the bearings against rust . . . cuts bearing maintenance costs. You can get it in three consistencies to meet all your mine car requirements.

Texaco Products have proved so effective in increasing efficiency and lowering operating costs in mines everywhere that –

More copper mining equipment in the U. S. is lubricated with Texaco than with any other brand.

Let a Texaco Lubrication Engineer help you achieve greater efficiency throughout your mine through more effective lubrication. Call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street. New York 17, N. Y.

MAKE WIRE ROPE AND OPEN GEARS LAST LONGER

Texaco Crater A protects wire rope against rust, wear and breakage. It penetrates the strands and preserves the core . . . stays soft . . . is easy to apply . . . keeps rope strong longer.

Open gears last longer when protected with the recommended grade of *Texaco Crater X Fluid*. It is liquid when applied, but quickly forms a tough, clinging film that reduces wear, cushions shock, quiets noise. Applied easily by brushing, pouring or spraying.

Lubricants and Fuels
FOR THE MINING INDUSTRY

KOEHRING DUMPTOR

No body hoist trouble . . . extra yardage every shift

KOEHRING SHOVELS keep up with DUMPTOR SPEED

Koehring 304 (¾ yard) Rock Shovel: Heavy Duty loader in ¾ yard class. Enclosed gears run in continuous oil bath

Koehring 605 (1½ yard) Rock Shovel: Exclusive power clutch eliminates operator fatigue. Boom-foot shock absorber permits greater speed in rock.

DUMPS IN 1 SECOND

Pull the release lever and gravity instantly tips the scoop-shaped body 90 degrees. One second later, load is dumped . . . you're ready to go for another load.

You don't waste 10 seconds, 20 seconds, 60 seconds. Kick-out pan keeps body clean in any material.

Because Dumptor has no body hoist, you have no body hoist trouble. Dumps fast even in zero weather. Saves all body hoist maintenance expense.

NO TURN-TIME, MORE HAUL-TIME

You save more seconds every trip, because Dumptor never turns on shuttle hauls. Three reverse speeds are just as fast as three forward speeds. Constant mesh transmission is especially designed for shuttle work.

DRIVE AXLE STANDS UP UNDER SHOVEL LOADING: Dumptor is built by a shovel manufacturer for work with rock shovels. Drive axle is 4" chrome nickel steel, heat treated. Steel case protects entire assembly. Welded steel body is heavily reinforced. Steering axle oscillates to absorb frame twisting shocks of haul road travel.

EASIEST TO MAINTAIN

Everything accessible. One man can do complete grease job in 5 minutes. Clutch removed in fraction of time it takes to remove a conventional clutch, because engine is not moved, transmission case is not touched. Every gear in transmission is removable through one cover.

YOU'LL NEED FEWER UNITS — IF THEY'RE DUMPTORS

Job studies prove 3 6-yard Dumptors can easily handle shovel output formerly requiring 4 other 6-yard hauling units. Generally, there is a saving of 20 to 25 per cent in number of units on jobs within Dumptor range of haul.

Experienced Dumptor engineers are ready to survey your off-the-highway haul problems. Contact your Koehring Distributor today.

KOEHRING HEAVY DUTY

NO BODY HOIST TROUBLE
because Dumptor has no body hoist. Gravity tips body instantly, returns it automatically when empty.

KOEHRING COMPANY, Milwaukee 10, Wisconsin
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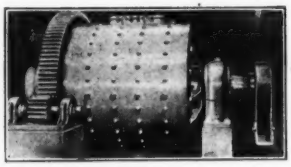
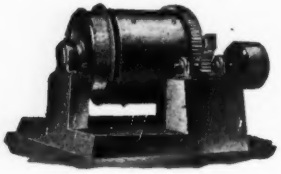
Grinding Problem?

RIB-CONE MILLS Cover all Grinding Needs

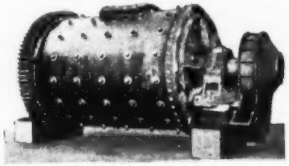
100 sizes and types of Straub Rib-cone mills are made to cover every grinding problem, large or small. All Rib-cone mills are made of steel for strength and lightness. You save on power and shipping costs. Lighter load on bearings means longer life. Below we show just a few of the types of Rib-cone mills available.



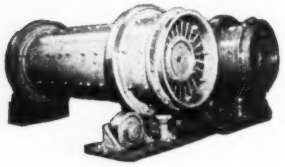
Low Pulp Line Mill—The very latest Rib-cone mill is the Champion series. To the right we show one of these. This modern all-steel welded mill is fitted with manganese liners and SKF pinion shaft bearings for low maintenance costs. Extra large diameter main gear permits the use of 1,800 RPM motors which are the lowest priced and most efficient. The Champion series Rib-cone mills are available in low pulp line, plain overflow, screening and convertible types with capacities ranging from 25 to 250 tons per 24 hours.



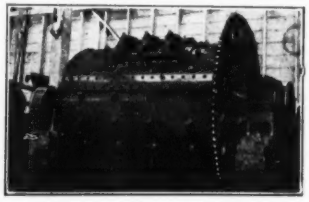
Screening Mill—For grinding to a recommended maximum of 48 mesh and for those who want a mill that does not require a separate classifier, we build the Rib-cone screening mill shown at the left. The patented screening classifier, which is an integral part of these mills, delivers a clean product with the size controlled by the screen used. This type of mill is particularly suitable for amalgamating and concentrating classes of ores, and is the most economical to purchase and install. Rib-cone screening mills are all manganese fitted and are made in standard or sectionalized construction from 2 to 95 tons capacity per 24 hours.



Plain Overflow Mill—Here we show an all-steel Rib-cone mill of riveted construction fitted with a combination scoop and drum feeder. This is a plain overflow type mill which gives excellent results when used for fine grinding in closed circuit. This mill can also be used for regrinding placer sands and concentrates prior to amalgamation or cyanidation, frequently in open circuit without a classifier. This type of mill is built in 2 to 250 tons capacity.



Open-End Grate Discharge Mill—Here we show two open-end grate discharge mills. This type of mill, with the discharge grate the full diameter of the mill, is particularly suitable for jobs that require a granular type product with a minimum of overgrinding. For the grinding of sands and concentrates in open circuit, these mills are unequalled. The feed end of the mill is supported on a large self-aligning hollow trunnion bearing. The discharge end is supported by a large steel tire resting on rollers fitted with sealed SKF bearings. The vertical thrust rollers on both sides of the tire are also sealed ball bearings. These mills are available in several sizes.



Sectionalized Mill—Take advantage of our 40 years' experience and leadership in building sectionalized mining machinery. We can furnish a complete sectionalized plant or a sectionalized Rib-cone mill as shown at the right. The mill shown is made in sections for field assembly. Every piece of sectionalized equipment is completely assembled in our shop before shipment. Then it is clearly marked and knocked down for shipping. This method of shop assembly avoids costly errors and permits reassembly with unskilled labor. We make sectionalized equipment in a wide range of types and sizes for "Anywhere a Mule Can Go."

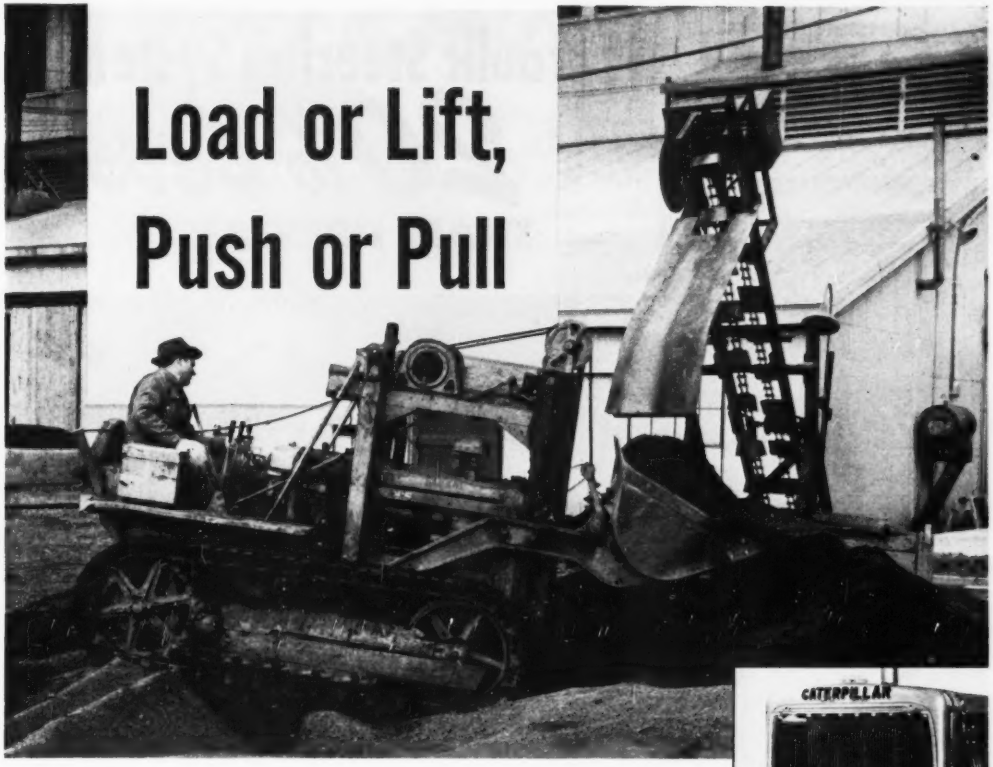
PIDANOS CATALOGO ESPANOL
SEND FOR CATALOG #303

519 CHESTNUT STREET **OAKLAND 7, CALIFORNIA**

STRAUB MFG. CO.

Kue-Ken Balanced Crushers	Rib Cone Ball Mills	Overflow Classifiers
Kue-Ken Simplex Crushers	Concentrating Tables	Feeders
Kue-Ken Gyratory Crushers	Overhead Eccentric Crushers	Screenwheel Classifiers

Load or Lift, Push or Pull

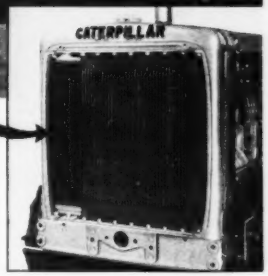


EVERYWHERE around a mine or a mine processing plant there are countless jobs that can be done faster, better, at lower cost by a "Caterpillar" Diesel Tractor and Trackson Traxcavator.

The D2-Traxcavator unit shown here is moving slag from the conveyor dump to a wasting area at the Northwest Lead Company's plant at Harbor Island, Washington. It is also used for handling some 40 tons of lead per day, moving boxcars and general clean-up work around the yards. On duty 24 hours a day, it's ready for any job that comes up.

The long-lived dependability of "Caterpillar" Diesel Tractors is backed by the complete parts and service facilities of "Caterpillar" dealers everywhere. For more information about cost cutting "Caterpillar" power, mail the coupon at the right.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS



OIL COOLER

Typical of the extra quality built into "Caterpillar" products is the oil-cooling radiator section that keeps lubricating oil at the most efficient temperature. Air-cooled oil keeps pistons and rings at lower temperatures, thus combating carbon deposits and sludge formation. Air-cooled oil resists molecular breakdown, adding life to main and connecting rod bearings. When low temperatures are encountered the oil is by-passed directly to all lubrication points.

CATERPILLAR DIESEL

REG. U. S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

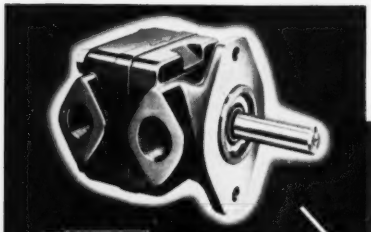
CATERPILLAR TRACTOR CO.
Box EM-10, Peoria, Ill.

Please send me your free booklet, "Three Steps of Strip Mining."

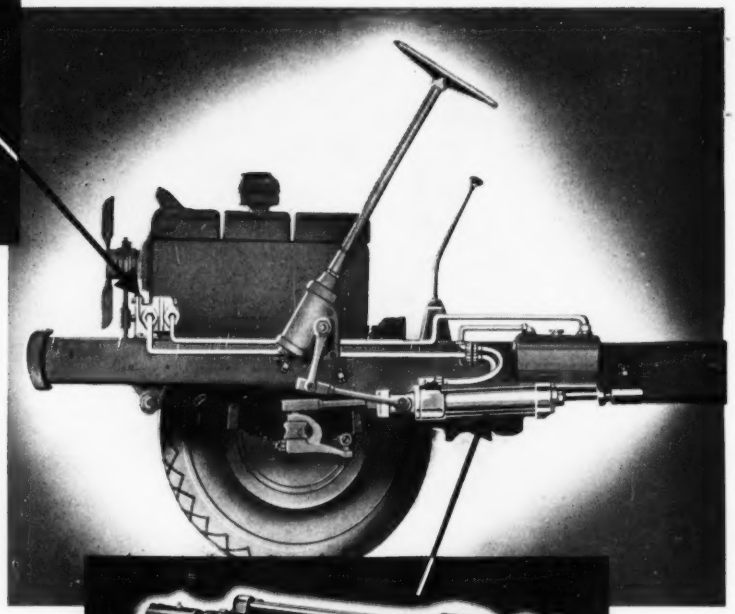
Name_____

Address_____

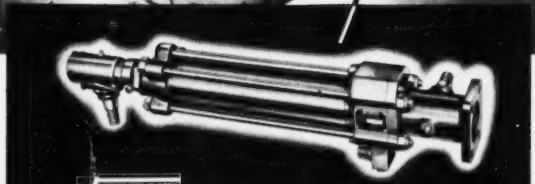
VICKERS Hydraulic Steering System COSTS YOU 20% Less THAN PREWAR



VICKERS SERIES V-200 BALANCED VANE PUMP
See Bulletin 49-52



At the current low prices, your new models should offer the added sales advantages made possible by VICKERS Steering System



VICKERS HYDRAULIC STEERING **BOOSTER** with integral overload relief valve . . . *See Bulletin 47-30a*

Improved design, better tooling and production methods of the past 10 years have resulted in a more than 20% price reduction in the Vickers Hydraulic Power Steering System. This saving greatly broadens the application possibilities of the Vickers Steering System.

Important among the many advantages of the Vickers Steering System are safety, effortless steering, adaptability and operator satisfaction. The resulting substantial customer acceptance and preference for Vickers Hydraulic Power Steering System is evident from its specification as original equipment by an increasing number of mobile equipment builders and operators alike. 3987

VICKERS Incorporated
DIVISION OF THE SPERRY CORPORATION
1405 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices:
ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • PHILADELPHIA • PITTSBURGH • ROCHESTER • ROCKFORD ST. LOUIS • SEATTLE • SUMMIT, N.J. • TULSA • WASHINGTON • WORCESTER

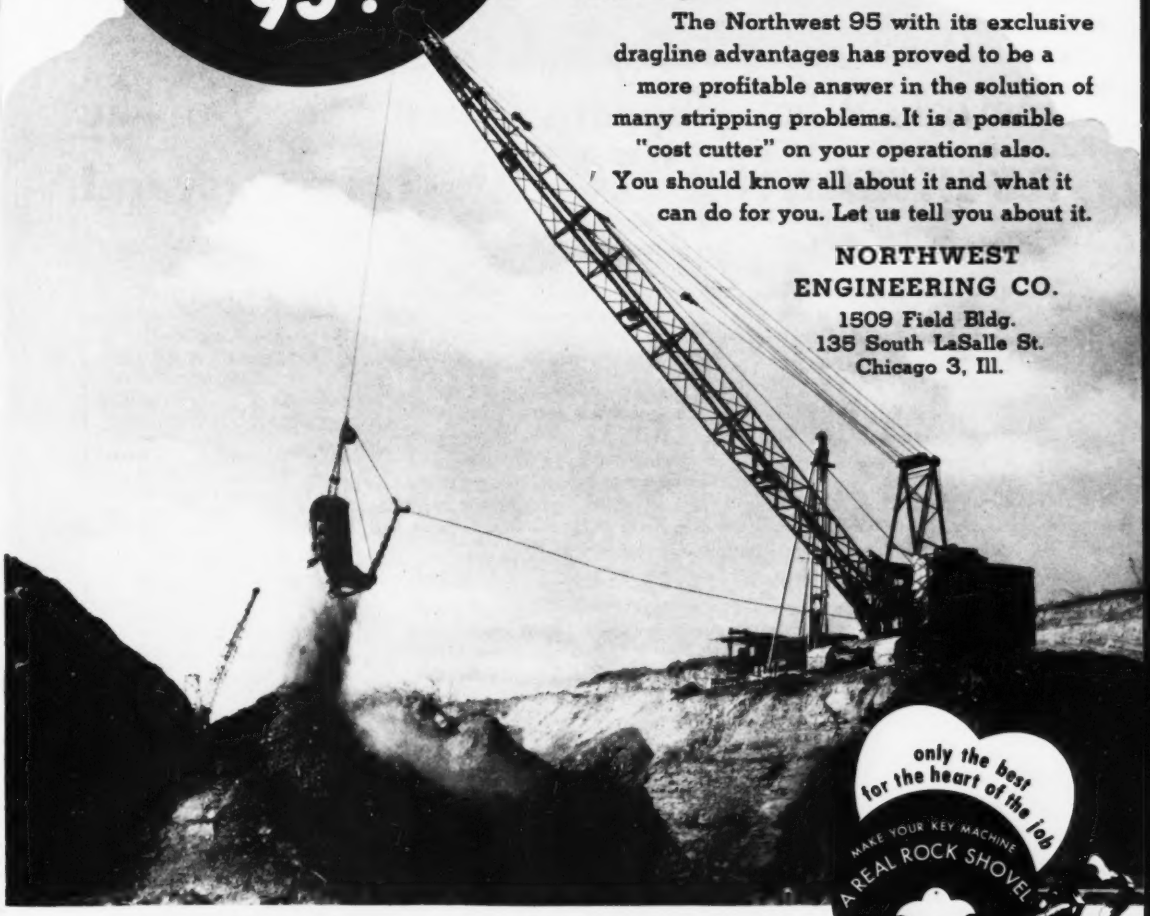
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

DO YOU KNOW about the NORTHWEST MODEL 95?

Here is the big machine of the Northwest Line—a Dragline capable of giving high output with long booms. Positive traction on both crawlers while turning, as well as when going straight ahead, makes steering easy and takes the 95 where other machines have difficulty. Fast operation, fast swing, ease of control, all combine to give output that equipment of even larger rated capacity finds difficulty in matching.

The Northwest 95 with its exclusive dragline advantages has proved to be a more profitable answer in the solution of many stripping problems. It is a possible "cost cutter" on your operations also. You should know all about it and what it can do for you. Let us tell you about it.

NORTHWEST ENGINEERING CO.
1509 Field Bldg.
135 South LaSalle St.
Chicago 3, Ill.



only the best for the heart of the job
MAKE YOUR KEY MACHINE A REAL ROCK SHOVEL
PROFIT

NORTHWEST

CRAWLER and TRUCK MOUNTED SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

Who Doesn't Want Breakage Like This?

Here Is What Happens When You Use The ROCKMASTER "16" Blasting System!

HERE's the kind of rock-pile blasters dream about! Rock ready for the shovel . . . no boulders too big for the dipper . . . a clean face . . . no toe . . . no backbreak. Blasters get the kind of results they want in quarries, mines, and construction jobs—on the surface and underground —when they use the ROCKMASTER "16" Blasting System to "tailor" the blast to the job. In stripping, they can shoot the burden like this without degrading the coal!

The original Atlas ROCKMASTER development now includes *sixteen* millisecond delay detonators, each timed within thousandths of a second. Your job may call for two, three, even all sixteen. We help you select them to fit the particular job. Drill pattern and explosives are based on what you want to accomplish. This all adds up to greater control over breakage and throw than was ever before possible—plus, in many cases, important savings in drilling and dynamite.

In addition to its many other advantages, ROCKMASTER "16" cuts noise and vibration to a minimum. Bigger shots (generally more economical) can often be made in quarries, strip pits and construction jobs without complaints from neighbors. In underground workings, there is less danger of damaged or loosened roof supports—a real safety consideration.

Write today for booklet on the Atlas ROCKMASTER "16" Blasting System. It includes diagrams for typical loading in quarries, strip pits, mines, and many types of construction.

ROCKMASTER "16" TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

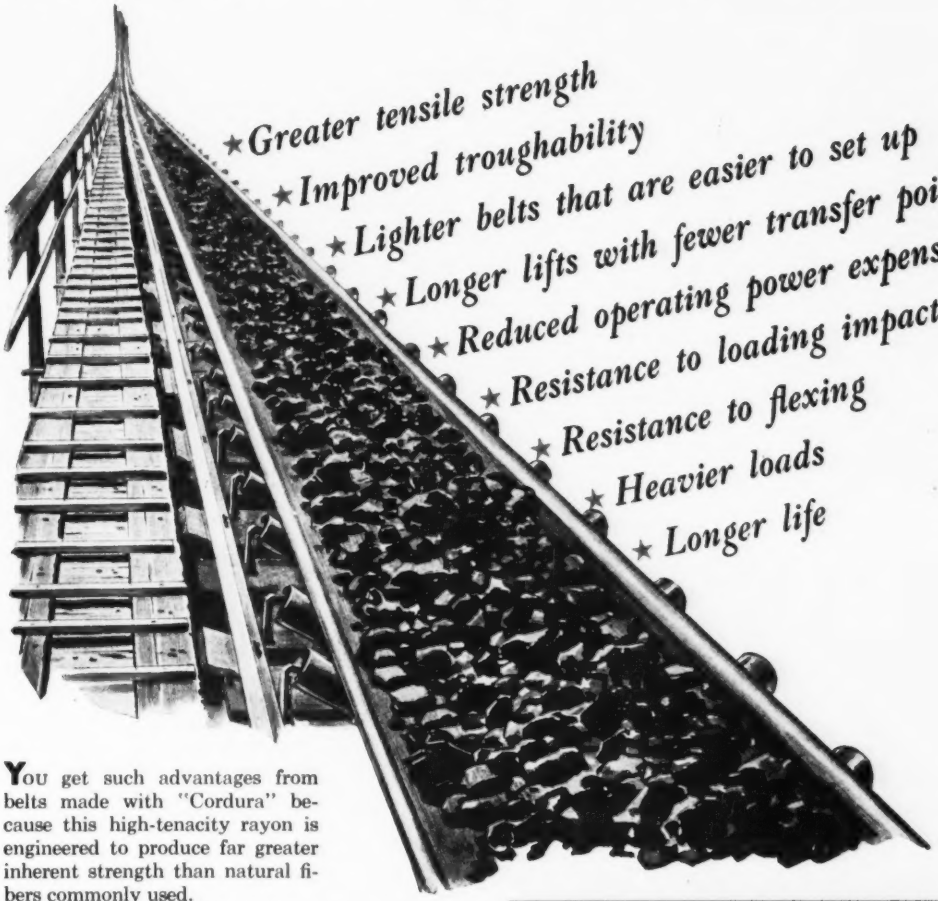
ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES *"Everything for Blasting"*

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

Here's how Du Pont Cordura* Rayon can improve your conveyor belt performance



★ *Greater tensile strength*
★ *Improved troughability*
★ *Lighter belts that are easier to set up*
★ *Longer lifts with fewer transfer points*
★ *Reduced operating power expense*
★ *Resistance to loading impacts*
★ *Resistance to flexing*
★ *Heavier loads*
★ *Longer life*

You get such advantages from belts made with "Cordura" because this high-tenacity rayon is engineered to produce far greater inherent strength than natural fibers commonly used.

A carcass reinforced with Du Pont "Cordura" Rayon makes possible a thinner, lighter belt that's easier to work with. And "Cordura" packs tensile strength into long-lift belts—yet provides outstanding troughability.

Du Pont "Cordura" High Tenacity Rayon means better belt performance and greater economy. Next time you need a conveyor belt, ask your supplier for a belt that's sinewed with "Cordura." And write today for more information on the use of "Cordura" in conveyor belts. Address Room 4729, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

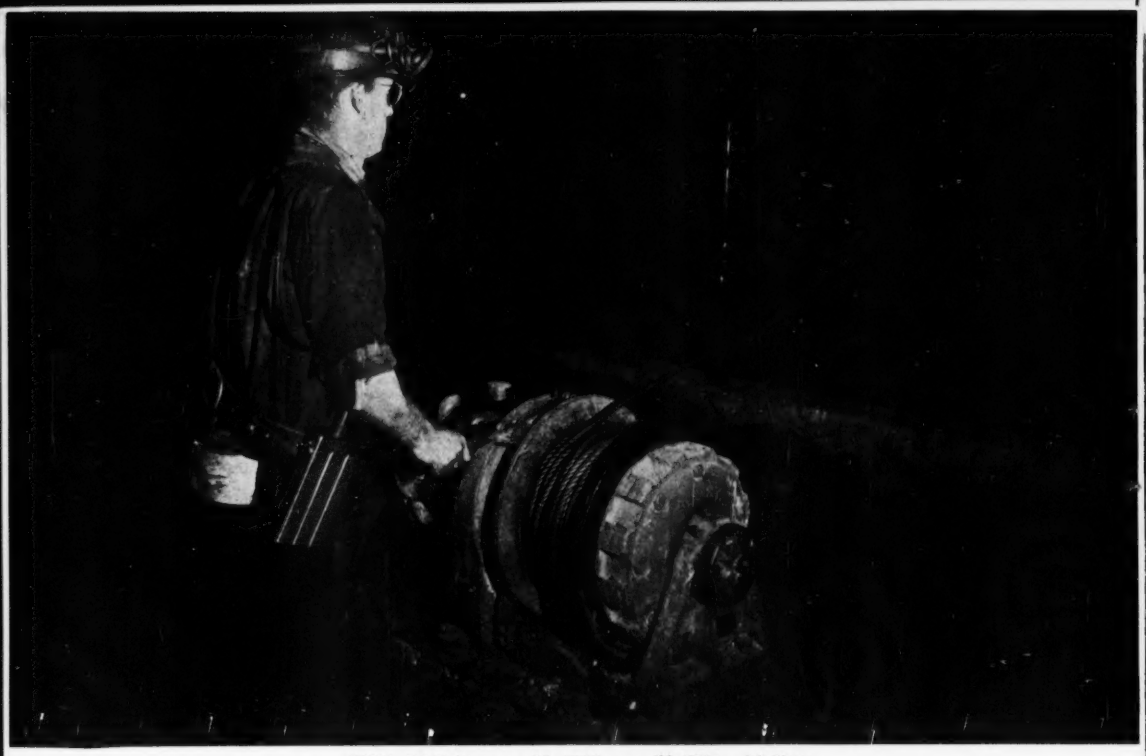
DU PONT "CORDURA" HIGH TENACITY RAYON

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

For RAYON...for NYLON...for FIBERS to come...look to DU PONT

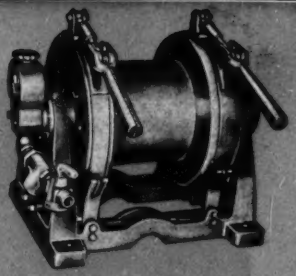


JOY L-111 Hoist, powered by JOY's reversible "Pistonair" Motor

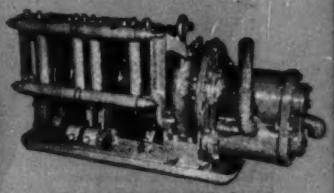
JOY SINGLE DRUM HOISTS

More for your money in every way!

- ★ **More Compact**
- ★ **Lighter Weight**
- ★ **Greater Power and Efficiency**
- ★ **Simpler Operation**
- ★ **Easier Installation**
- ★ **Greater Endurance**
- ★ **Minimum Maintenance**



Above, JOY E-112 Hoist, with a 5 H.P. JOY exclusive "Turbinair" motor. Can be mounted on a car, timber, column or bar for every type of hoisting job.



Above, JOY FF-211 Slusher, for all-purpose scraping jobs. Illustrated with 10 H.P. "Turbinair" motor, but features interchangeability of drives to suit conditions.

Left, JOY AW-80 Air Winch, a compact, rugged, flexible hoist for every small job. Weighs only 85 lbs., will lift 500 lbs., is powered by reversible piston-type motor.

JOY C-111 heavy-duty Shaft Hoist, with a 50 H.P. slip ring motor. Can be diesel-driven if desired. Lifts 5000-6000 lbs. at speeds up to 300 ft./min.

Specify "JOY"

for every HOIST or SLUSHING JOB

. . . air-powered or electric

WRITE FOR BULLETIN, OR

Consult a Joy Engineer

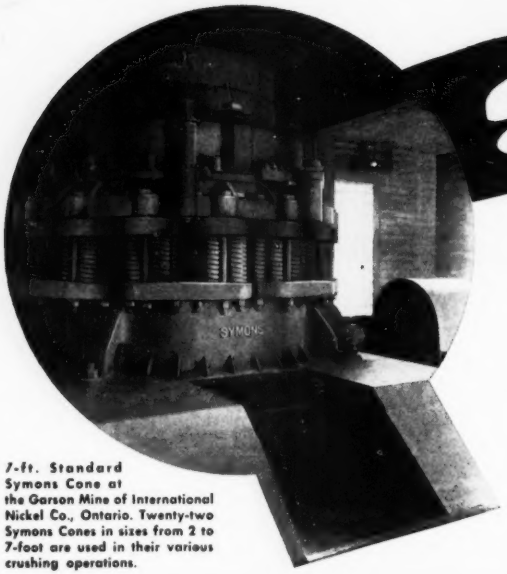
W&D M2438

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Symons CONE CRUSHERS

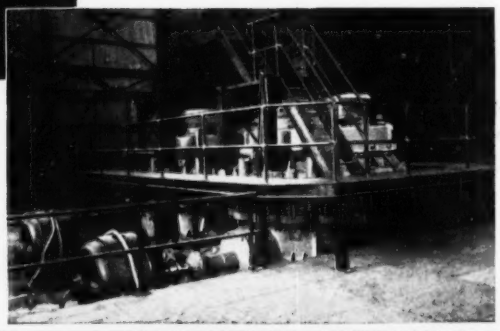


7-ft. Standard Symons Cone at the Garson Mine of International Nickel Co., Ontario. Twenty-two Symons Cones in sizes from 2 to 7-foot are used in their various crushing operations.

. . . USED BY COMPANIES WHO KNOW FROM EXPERIENCE

AMONG the larger and more progressive mining companies the world over, Symons Cones are found where fine crushing is done in quantity. Users appreciate the Symons enormous capacity at fine setting and the production of uniform mill feed which result in greatly lowered crushing and milling costs. Whether for a new plant or a modernized existing plant, Symons Cones meet today's requirements for fine crushing.

Showing five of the ten 7-ft. Standards and 7-ft. Short Heads installed at the Climax Molybdenum Co., Climax, Colorado.



Homestake Mining Co. of South Dakota uses these two 7-ft. Standard Cone Crushers in gold mining operation.

M349

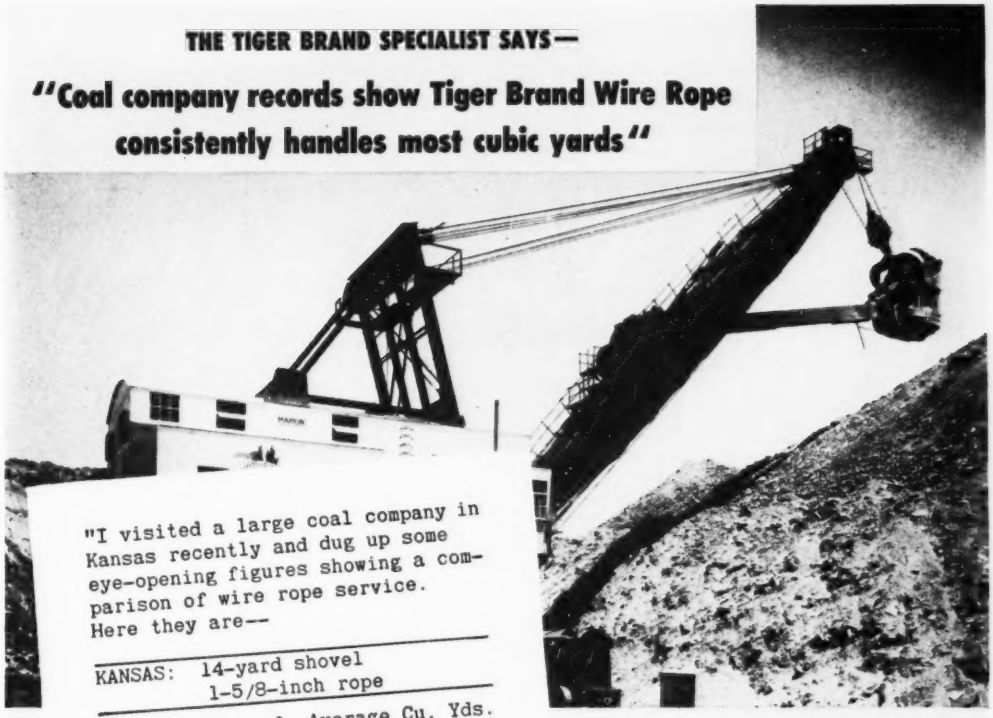
NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN
NEW YORK • SAN FRANCISCO • WASHINGTON • SPOKANE
MEXICO D. F. • LONDON • TORONTO • JOHANNESBURG

NORDBERG

Machinery for processing ores and industrial minerals

THE TIGER BRAND SPECIALIST SAYS—

"Coal company records show Tiger Brand Wire Rope consistently handles most cubic yards"



"I visited a large coal company in Kansas recently and dug up some eye-opening figures showing a comparison of wire rope service. Here they are—

KANSAS: 14-yard shovel
1-5/8-inch rope

	No. of Ropes	Average Cu. Yds. handled per rope
Tiger Brand	16	529,605
Brand A	4	486,614
Brand B	12	401,722
Brand C	4	436,353
Brand D	7	432,050

"This is not just an isolated case. Time after time where direct comparisons have been made of wire rope service life, Tiger Brand stands at the top of the list."

TIGER BRAND Wire Rope Specialists are interested in seeing that you get a full dollar's worth of performance out of every dollar you invest in wire rope. Most of their time is spent right out where the rope is used.

That's why these engineers are qualified to give you service that is both helpful and speedy. Besides helping you select the most practical wire rope, they can often give you valuable money-saving tips on operation. Ask one of these men to call.

SEND FOR FREE BOOKLET

American Steel & Wire Company
Rockefeller Building, Dept. C-10
Cleveland 13, Ohio

Please send me a copy of your booklet, "Valuable Facts . . . About The Use And Care of Wire Rope."

Name.....

Company.....

Address.....

City.....State.....

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

AMERICAN TIGER BRAND

WIRE ROPE

Excellay Preformed

UNITED STATES STEEL

Amsco-nagle

MATERIALS HANDLING

Pumps

1. Simple design—only three wearing parts.
2. Easy replacement of impeller, casing, and plate without disturbing bearing stand or drive.
3. Water end parts of austenitic manganese steel or ABK Metal, whichever is best suited for the particular job.
4. Stuffing box accessible from above or below.
5. Split bearing stand—easy to dismantle.
6. Initial high efficiency maintained with slippage seal adjustment.
7. Oversized, grease lubricated, deep-grooved ball bearings for long wear with minimum servicing.

Amsco-nagle 6" Type "T" frame 19 pump for handling surplus sand at the Chillicothe, Ohio plant of Southern Ohio Quarries Company.

Good for BAD mixtures

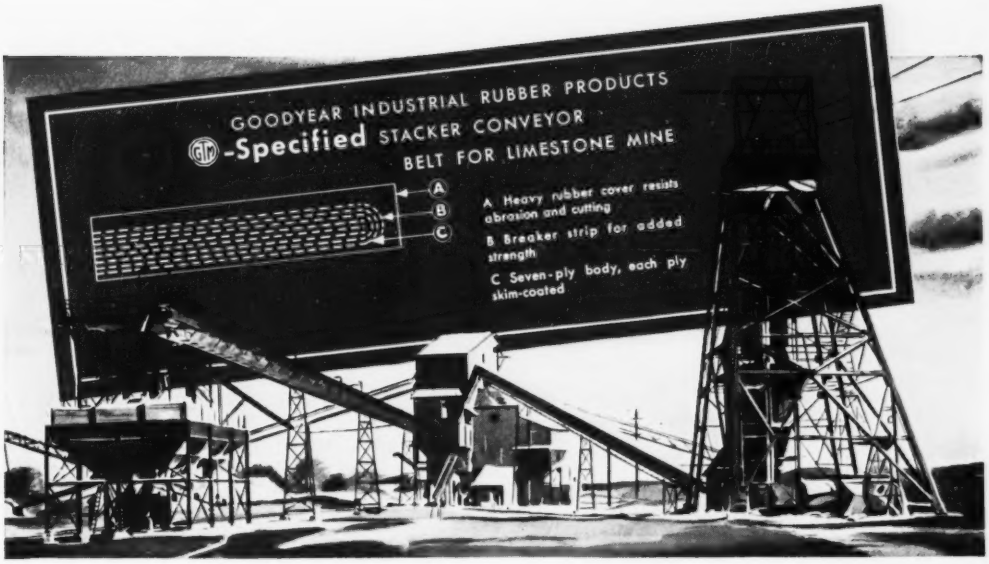
No matter how abrasive the material to be pumped, or how laden with solids, there is an Amsco-nagle Pump for the job. In the pumping of slurries, coal fines, sand and gravel aggregates, sludge and similar materials, an Amsco-nagle will outpump and outwear ordinary equipment by a substantial margin. In many applications Amsco-nagle Pumps are performing with satisfaction where other pumps have failed.

Amsco-nagle pumps are manufactured in sizes 6" to 16", for capacities up to 10,000 G. P. M. and for heads up to 200 feet (250 feet for certain applications). We will be glad to supply you with full information. Write for Bulletin 547-IP for data on all types of Amsco-nagle Industrial Pumps.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo. Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.



They tote thousands of tons per day

in the world's deepest limestone "mine"

BURIED half a mile under Ohio is the world's deepest "quarry"— a mine that produces limestone at the rate of thousands of tons per working day. And every ounce of that river of rock rides on Goodyear Conveyor Belts for much of the way between the working faces of the mine and storage bins located on the surface.

When the mine owner called in the G.T.M.—Goodyear Technical Man—to recommend the belts best suited to conveyorize the operation, he specified Goodyear Stacker Conveyor to carry the limestone from crusher to storage bins—both located deep in the mine. Three belts — each 42" wide, 7-ply construction — were installed to handle this part of the operation. The G.T.M. recommended Stacker Conveyor because Stacker's extremely tough covers and bonding breaker are more than strong enough to handle the severe abrasion of the rock.

At the shaft head, the crushed rock travels from head frame to storage bins via nearly a half mile of Goodyear 6-ply, 32-oz. duck belting, installed on seven different conveyors handling various sizes of rock.

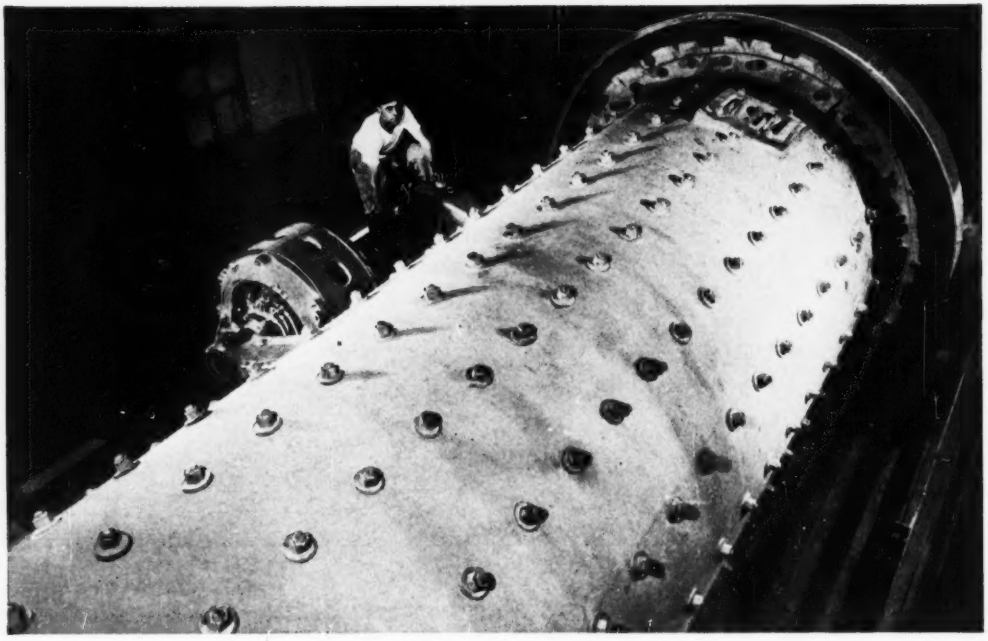
Altogether, this mine uses a total of ten Goodyear conveyor belts—all installed in accordance with the recommendations of the G.T.M. His recommendations can be your own best insurance of economical, long-life conveyor belt haulage, either above ground or below surface. It will pay you to consult the G.T.M. first. Write him c/o Goodyear, Akron 16, Ohio.

For Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.*

We think you'll like "THE GREATEST STORY EVER TOLD" Every Sunday—ABC Network

GOODYEAR

THE GREATEST NAME IN RUBBER



11 Years Trouble-free Washing With Allis-Chalmers Blade Mill

NEITHER LINERS nor blades have had to be replaced on this 7 by 18 ft A-C blade mill in the washing plant of Blair Limestone Co., Martinsburg, W. Va. No shut-downs since mill was put in production in 1938!

Limestone flux for blast furnace feed is produced here. Specifications are exacting; product must be free of contaminants. This blade mill has 112 internal cast steel blades which wash stone and chips thoroughly clean by *combined cutting and washing action.*

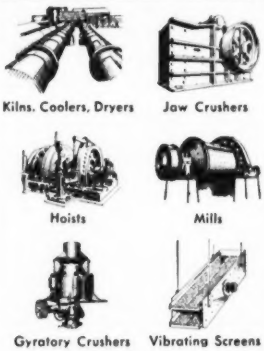
CHECK IMPORTANT FEATURES

Because Allis-Chalmers blade mills are supported on trunnion bearings instead of rollers, faster speeds and more intensive washing are possible. This mill, for example, revolves more than *twice as fast* as the average roller mounted scrubber. A permanently fixed relationship between gearing and drum is assured.

Shells are heavy, all-welded steel plate. A special seal on feed end bearing prevents backwash of abrasive pulp. Liners and blades are renewable and are available in abrasion-resistant alloy steels.

Allis-Chalmers blade mills handle ores and aggregates up to 10 inches in size. Mill diameters are 6, 7, 8 and 9 ft; lengths 10 to 22 ft. Variable speed, pulp level and blade adjustment make possible a wide range of applications in mining and processing.

A trained A-C processing engineer in your area will gladly look over your production set-up and help you select an economical blade mill or other washing equipment. A-C offices or distributors are in principal cities in the U. S. and throughout the world.



AND OTHER EQUIPMENT FOR THE CRUSHING, CEMENT AND MINING INDUSTRIES

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

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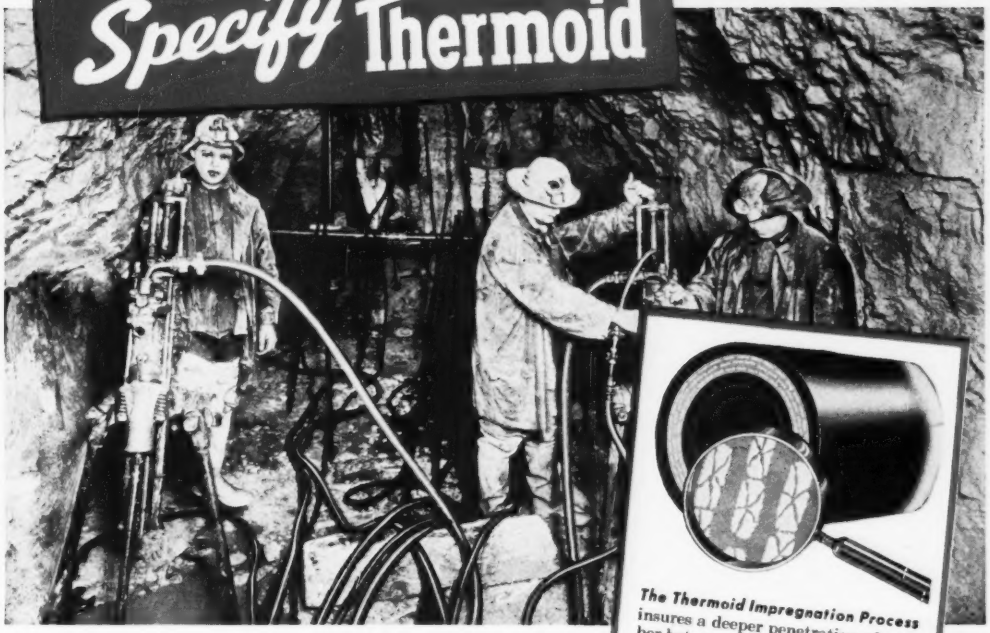
A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Specify Thermoid



The Thermoid Impregnation Process insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasive action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tightly, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

New Air Hose For Mine Service

From Thermoid's planned program of product development and improvement—a new air hose for mine use. Specifically designed for this exacting requirement—field proven in actual operation—it offers the maximum in trouble-free service. Heavy synthetic rubber oil-proof tube—rayon cord reinforcement for greatest strength and flexibility—smooth extra heavy rubber cover for maximum resistance to abrasion and cutting from sharp rocks.

Mandrel-built to assure uniform inside diameters. All sizes from ¼" to 1½" inclusive in 50′ lengths. Available from your nearest Thermoid distributor or if you prefer write us for additional information.

It will pay you to *Specify* Thermoid!

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

Thermoid Company

Main Offices and Factory • Trenton, N. J., U. S. A.

Western Offices and Factory • Nephi, Utah, U.S.A.

Industrial Rubber Products • Friction Materials • Oil Field Products

TIMKEN® CARBIDE INSERT ROCK BITS POST ANOTHER VICTORY OVER TIME!

Time was short—the rock was hard when Porter-DeWitt Construction Company, Poplar Bluff, Mo., started work on the Missouri Pacific Railroad's relocation job near Gads Hill.

A cut 1,000 feet long, 55 feet deep and 34 feet wide, involving the excavation of 55,000 yards had to be made through some of the hardest porphyry rock in the state of Missouri.

Faced with this problem, the contractor selected Timken carbide insert rock bits for the job. Result, work completed on time; costs kept in line with the contract.

The contractor has expressed his complete satisfaction with the performance and economy of Timken carbide insert bits on this project.

You have the rock; we have the bit, know-how and experience to beat it—save time, cut cost.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

THE TIMKEN ROLLER BEARING COMPANY
CANTON 6, OHIO
Cable Address "TIMROSCO"

Proof THAT DENVER TESTING PAYS CONTINUING DIVIDENDS

Cost of crushing was reduced when screening tests showed Denver-Dillon Vibrating Screen would effectively screen out 50% of crusher feed which was already sufficiently fine.

Different reagent combination—and stage addition of reagents throughout flotation circuit not only reduced reagent consumption and cost, but also improved net recovery.

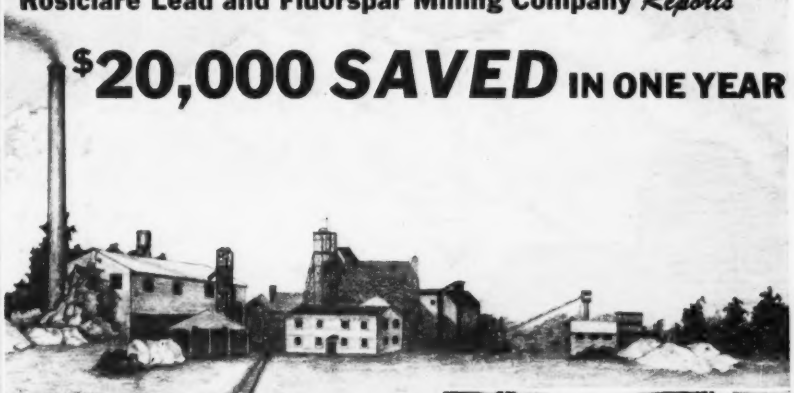
Tests proved how Denver Selective Mineral Jig could recover another mineral from complex ore profitably.

Cost of grinding was reduced when tests showed that by floating a coarser size particle and regrinding the middling particles in Denver Steel Head Ball Mill, recovery was increased and tailing losses due to slimes were lowered substantially.

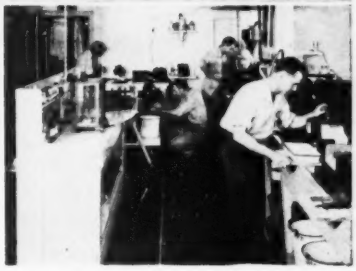
When mineral characteristics of mine-run ore changed, Denver Laboratory Tests were used to determine most efficient flowsheet.

Rosiclare Lead and Fluorspar Mining Company *Reports*

$20,000 SAVED IN ONE YEAR



HOW THIS OPERATOR PROVED TESTING PAYS!



The Problem

The problem confronting the Rosiclare Lead and Fluorspar Mining Company of Rosiclare, Illinois, was *how to economically recover galena and lead carbonate from ore fractions too fine for treatment in the heavy media plant.*

Solution

Testing proved lead could be recovered by Denver Selective Mineral Jigs. Two Denver Mineral Jigs (sizes 12″x18″ Duplex and 16″x24″ Duplex) were recommended and installed.

Result

Cost of *entire installation* including labor, materials and accessory equipment such as *hydraulic classifiers, pumps, steel flooring, piping* and *all dewatering devices* was returned by *over 400% in only 11 months'* operation.

Rosiclare Lead Reports:

"—With the introduction of Denver Jigs we killed two birds with one stone—(1) we removed the lead prior to recovery of fine sized gravity spar concentrate thus eliminating lead as an undesirable impurity and (2) we recover the lead in a marketable form at low cost."

Complete Ore Testing Facilities

Deco's modern ore testing facilities, the knowledge and experience gained in making thousands of ore tests of more than 150 different commercial minerals and materials from all parts of the world are available to serve you on a non-profit basis.

Our Test Engineers are practical research men with years of testing experience. They are constantly in touch with leading mines, mills, universities, research bureaus, reagent manufacturers and designers of other mineral recovery equipment in order to make available to our friends the world's most economical and efficient methods of mineral recovery.

This vast experience accounts for our ability to quickly and economically arrive at practical solutions to tough treatment problems.

Your Cost for Denver Ore Test

As soon as we receive information about your ore and the tests required, our Test Engineers will furnish you a quotation based on the *actual cost-to-us* for making your tests. Then, if you desire, a sample of ore is submitted and your ore test is scheduled.

There is no obligation whatsoever when inquiring about cost of an ore test. Yet, results of competent testing can mean *improved recovery, lower tailing losses and reduced operating costs.* Write today.

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

FLOTATION ENGINEERS

DENVER • NEW YORK CITY • CHICAGO
EL PASO • TORONTO • MEXICO, D. F.
LONDON • JOHANNESBURG • RICHMOND, AUST.

... friends happier, healthier, and wealthier

DENVER EQUIPMENT COMPANY
1402 Seventeenth St., Denver 17, Colorado

Please send me complete information on Denver Ore Test of _____ (material)

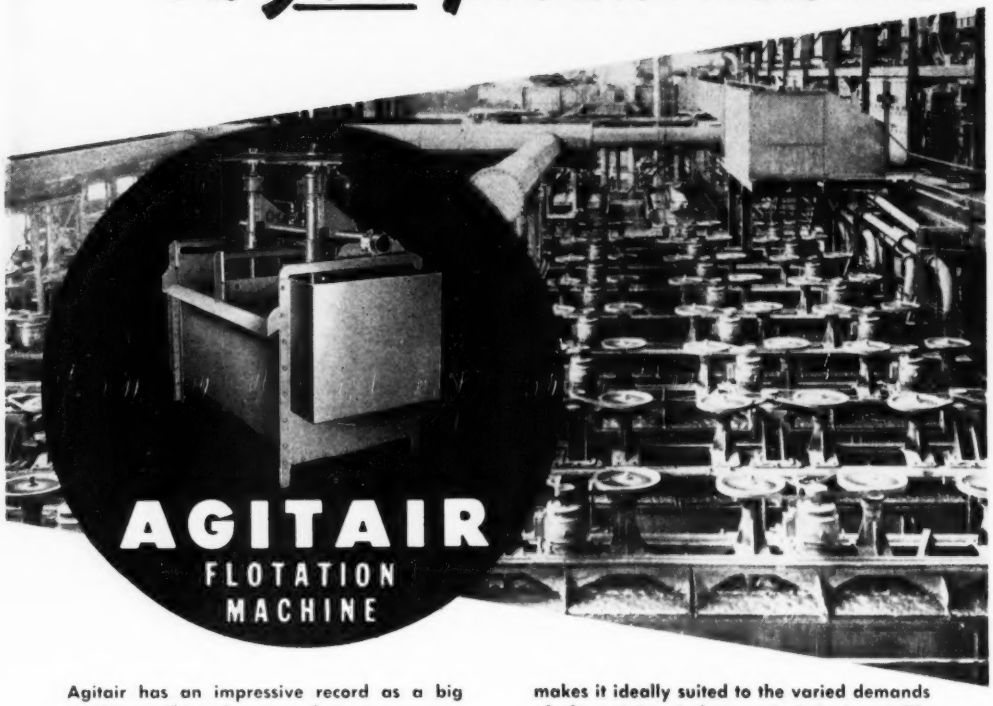
Name _____

Title _____

Company _____

Address _____

put AGITAIR on your production line



Agitair has an impressive record as a big producer. Through years of service on production lines in all the major mining centers of the world it has proven its outstanding capacity for profitable handling of large tonnages of ore. Agitair is able to treat greater tonnages per unit of machine because of its exclusive principle of straight-line flow and gravity head feed. This outstanding feature, combined with flexible system of controls, makes it ideally suited to the varied demands of the mining industry. Agitair is readily adaptable to all kinds of flow-schemes and to special metallurgical problems that arise in mill operation.

•

Agitair, a pioneer in the field of flotation, provides the safeguard of long experience and the assurance of wide acceptance. Write for detailed information.

"LEADERS IN EXPERIENCE AND SERVICE"

THE GALIGHER COMPANY

METALLURGICAL DIVISION

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AGENTS IN ALL PRINCIPAL FOREIGN MINING DISTRICTS

ALUMINUM IS LIGHT

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These facts set new standards for mine tools

Handle easier . . . operate easier. Mine operators tell us they want these attributes in mine tools. Alcoa Aluminum answers that demand in the form of sturdy, light weight rail benders, rail jacks and other equipment.

Making Aluminum last longer, work harder . . . that's been Alcoa's job for 61 years. It's a continuing job with our Development Division . . . advising on alloy selection, helping with problems of fabrication, making sure that Alcoa Aluminum goes into practical applications that make friends for it in the mining industry. Want to try aluminum in your own mine? Alcoa's standard shapes can lower costs and increase efficiency. Get a copy of the free book, "Alcoa Aluminum and Its Alloys" from your nearby Alcoa sales office, or write ALUMINUM COMPANY OF AMERICA, 650K Gulf Building, Pittsburgh 19, Penna.

ALCOA FIRST IN ALUMINUM

ALCOA ALUMINUM

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ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

Long, Long Trail—CUT SHORT

Continuous, large volume flow of ore, nearly a million tons per year, travels over this S-A designed conveyor system to cut short the long, long trail formerly made by trucks from the open pit to processing plants.

Typical of the many open-pit ore handling systems S-A engineers have designed and built during the past 50 years, this system moves ore faster at lower cost per ton and with less effort. Whatever your bulk handling problem may be . . . depend on S-A engineers to supply an efficient, economical conveying system . . . designed and equipped to meet your specific requirements.

Submit your bulk materials handling problems for the recommendations of S-A engineers. This service costs you nothing . . . Write today.

MINNESOTA IRON RANGE MINE

From the open pit of this mine on the Minnesota Iron Range, ore travels on an S-A designed conveyor system 1750 feet to preparation and sintering plants at the surface near the edge of pit. S-A "PACIFIC" type carriers are used with S-A Impact Carriers under the feed point. Approximately 100,000 tons of ore pass over this 30" wide belt conveyor system each month during the 7 or more months of operation each year.

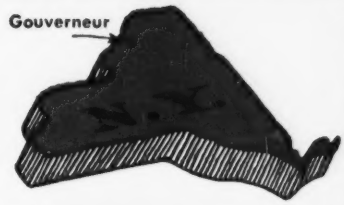
STEPHEN S-A DAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Illinois · Los Angeles, Calif. · Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

RockerShovels at work for

LOOMIS TALC



An Eimco Model 12B loading talc at Loomis Talc Mine

Eimco RockerShovels working deep in the earth are helping produce Gouverneur Fibrous Talc, a very old, rare and valuable ingredient in some of our common important everyday products such as paint, ceramics, paper, rubber and many other items.

The W. H. Loomis Talc Corporation, producers of this material, have, after numerous tests, standardized on Eimco RockerShovels for loading the talc into mine cars for transportation to the surface.

RockerShovels are standard equipment wherever mining is being done — because RockerShovels stay underground longer without coming up for repairs; provide greater protection for the operator; and, load more tons per shift, day in and day out, than any other comparable machine.

RockerShovels are better on every count — write for more information on any of the 3 underground models — Model 12B for 1 ton per minute; Model 21 for 2 to 3 tons per minute and Model 40 for 4 to 5 tons per minute.

EIMCO

THE EIMCO CORPORATION

new!

a 55-lb. class sinker with a 4-in-1 backhead

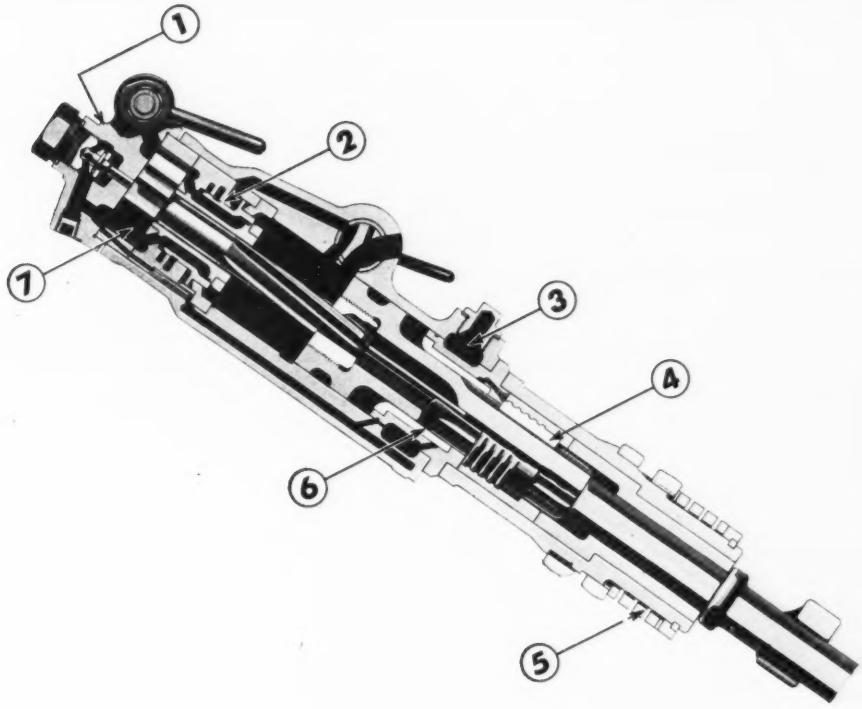
New in design . . . easy to hold . . . tops in drilling speed, rotation, hole cleaning and all-around performance . . . is the new CP-59 Sinker Drill.

Now, for the first time, you can get a sinker with a 4-in-1 backhead that meets *all* operating conditions: **plain dry . . . blower dry . . . plain wet . . . air-water** operation. One backhead meets all four requirements; change-overs from one type to another are quick and inexpensive.

Entirely new valve design gives maximum drilling speed and rotation power, with minimum air consumption. Large, flexible retainer spring makes for easy operation. A new type of lubricating system assures positive lubrication of all working parts.

Rotation nut and cylinder bushing liner are bronze, to eliminate scoring and reduce maintenance.

For complete information, ask for SP-3009.



Top performance, minimum upkeep are assured by these features of new CP-59 Sinker:

1 Four-in-one backhead; plain dry, blower dry, plain wet, air-water operation.

2 New type valve gives exceptional drilling speed with powerful rotation.

3 One oil chamber efficiently lubricates entire drill.

4 Replaceable bronze chuck rotation nut protects piston splines from scoring.

5 Large, flexible retainer spring assures easy operation.

6 Replaceable bronze cylinder bushing liner makes it easy to maintain full cushion and piston alignment.

7 Four reversible pawls double service life.

CHICAGO PNEUMATIC TOOL COMPANY

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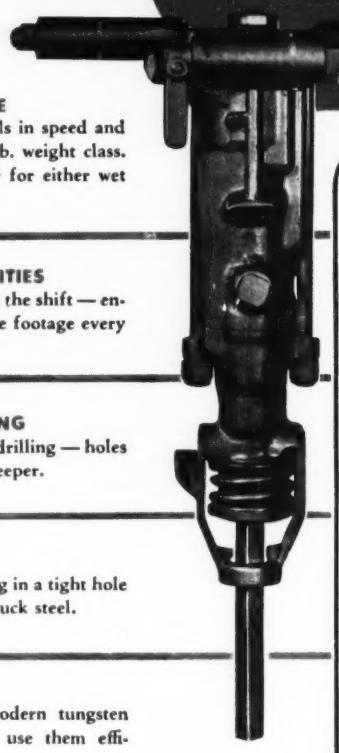
. . . no other Sinker gives you all these advantages!

new! GARDNER-DENVER S48 Sinker



SUPERIOR DRILLING PERFORMANCE
— equals most 55-pound drills in speed and power — yet is in the 45-lb. weight class. An outstanding performer for either wet or dry drilling.

SUPERIOR RIDING QUALITIES
— easier handling throughout the shift — enables operator to drill more footage every day.

SUPERIOR HOLE CLEANING
— better hole-cleaning while drilling — holes are bottomed faster and deeper.

SUPERIOR ROTATION
— extra fight keeps bit turning in a tight hole — reduces possibility of stuck steel.

SUPERIOR DESIGN
— especially suitable for modern tungsten carbide bits — helps you use them efficiently.

SUPERIOR CONSTRUCTION
— rugged, dependable, simple — fewer trips to the shop.

No other Sinker has all these advanced features

- Exclusive backhead design — lets you change from wet to dry or to automatic air-operated water control without taking the drill apart — without changing the backhead. Simply change the gland and tube.
- Air or water tube comes out with the gland — no fishing for an elusive tube.
- Straight throttle valve — will not bind or leak.
- Air-cleaning screen that automatically cleans itself when blowing.
- New-type, free swiveling water connection — has positive water seal and large area tubular screen.
- Exclusive steel puller — swings clear of the chuck—easily operated by foot or hand—easily assembled without wrenches—no nuts to keep tight.
- Write today for full information on the NEW Gardner-Denver S48 Sinker.

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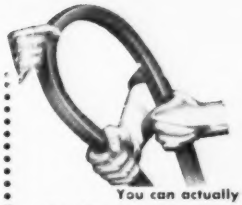


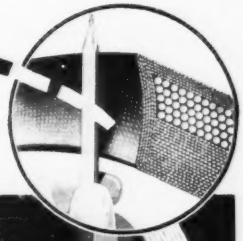
You can actually *feel* the sides of a belt *change shape* as the belt bends.

In Two Minutes You Can See Exactly How . . .

The Concave Side

(U.S. Patent No. 1813698)

SAVES Your Transmission DOLLARS



Take *any* V-belt in your hands and bend it as it bends in going around a pulley. You will see that the top of the belt, being under *tension*, grows *narrower*. The body, under compression, *widens*. The sides *bulge out*.

This shape change—in a *straight-sided* V-belt—is shown in Figures 1 and 1-A, below.

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove.

Now look at Figures 2 and 2-A. There you see how the *same shape change* affects the V-belt built with the precisely engineered *Concave Side* (U.S. Patent No. 1813698).

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit in Sheave Groove.

The top of the belt narrows, the body widens. But the sides *merely straighten—and* the new shape *exactly fits* the sheave groove!

Two savings result. (1) Uniform side-wall wear—*longer life!* (2) Full side-wall grip on the pulley carries heavier loads and *sudden load increases* without slipping; saves belts, saves *power!*

The Mark of SPECIALIZED Research

The Concave Side is *MORE IMPORTANT NOW Than Ever Before*

Because the sides of a V-Belt are what actually drive the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

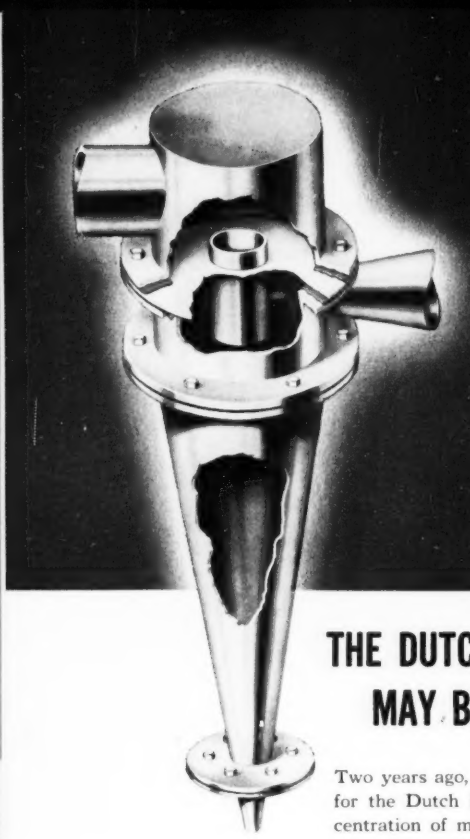
Now that Gates SPECIALIZED Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

4910

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U.S. and 71 Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts



FINE-ORE TREATMENT?

THE DUTCH STATE MINES CYCLONE SEPARATOR MAY BE THE ANSWER TO YOUR PROBLEM

Two years ago, Cyanamid became Technical and Sales Representative for the Dutch State Mines Cyclone Separator Processes for the concentration of metallic and non-metallic minerals. Since then, intensive pilot plant testing in the Cyanamid Mineral Dressing Laboratory as well as field testing and mill application have indicated some of the economic uses of these processes.

The place of a new process is seldom easy to define. Additional data come to hand constantly. Current viewpoints are always subject to change and expansion. But, the applicability of these processes is now sufficiently clear to warrant the active interest of anyone concerned with fine-ore treatment . . . particularly in the size range between that treated by Heavy-Media Separation and froth flotation.

* * *

Broadly the Dutch State Mines Cyclone Separator Processes merit study and testing:—

1 *As low-cost methods of pre-concentrating ore or tailings* where the feed contains only a small percentage of high-value minerals.

EXAMPLE: *TIN TAILINGS.* A tin tailing containing .75% Sn has been concentrated to 4% grade. This is higher than average mill feed. Other tests on tin ores have demonstrated that equally good results can be obtained; that either magnetite or autogenous media may be used; that the cost of treatment would be but a small fraction of the values recovered.

In some instances, re-run zinc and other base-metals tailings dumps may be milled profitably by using the Dutch State Mines Cyclone Separator. In the size $^3/_8$" and below, tests show that 50% recovery can be made from zinc tailings containing only 1% values. This alone represents a potential "reserve" of many thousand tons of zinc metal!

2 *To produce directly a marketable concentrate* from fine material of low value.

EXAMPLE: *FINE IRON-ORE.* Pilot plant tests indicate the economic use of the Dutch State Mines Cyclone Separator, employing an autogenous medium, for the final concentration of fine sizes. Tests on certain iron ores on sizes above 48 mesh have shown recovery and grades higher than any other process now in use for treatment of −3/16″ materials.

3 *To treat fine feeds* which are inherently not amenable to jig or table treatment or cannot be economically concentrated by froth flotation.

EXAMPLE: *SPODUMENE.* Despite the ample difference in specific gravity between mineral and gangue, the flat shape of spodumene crystals often precludes the use of tables or jigs. Hand-picking has been the traditional method of concentration. The Dutch State Mines Cyclone Separator, using a low-cost magnetite medium, is capable of making an accurate, low-cost separation on −10 mesh spodumene. Numerous other "untreatable" feeds have responded to the Dutch State Mines Cyclone Separator with studies going forward looking toward mill applications.

4 *For any unusual concentration problem* to improve present methods and to reduce costs.

EXAMPLE: *DIAMOND GROUND.* Grease tables, employed to separate industrial diamonds from gangue, are highly efficient as the final recovery step. They have, however, relatively low capacity and involve the use of a considerable labor force. A substantial reduction in gangue before tabling is to be desired. In the size range 10 mesh and below, tests show the Dutch State Mines Cyclone Separator to be an extremely accurate method for pre-concentrating this valuable feed before treatment on the tables.

EXAMPLE: *POTASH.* Pilot plant tests on several potash ores show that the Dutch State Mines Cyclone Separator Processes can make an accurate separation between Sylvite (sp.g. 1.98) and the Halite (sp.g. 2.15) and gangue minerals, despite the small difference in their specific gravities. Separations are made on the ¼″ x 0 size range, using a saturated solution of brines with magnetite as the medium.

* * *

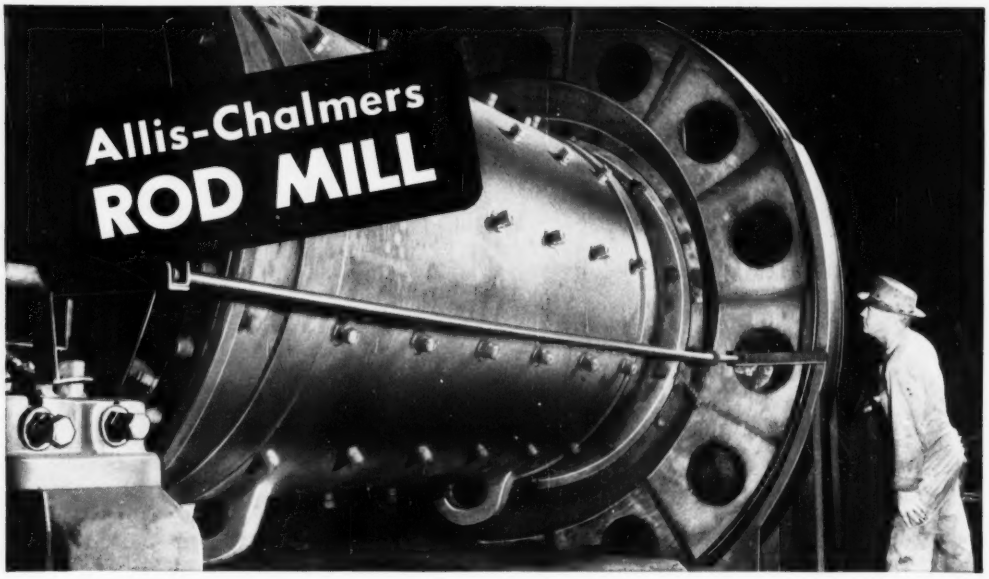
The Dutch State Mines Cyclone Separator Processes, utilizing powerful centrifugal-centripetal forces, offer new means to separate a troublesome size fraction by specific gravity difference.

Cyanamid has commercial-size Dutch State Mines Cyclone Separators operating at the Cyanamid Mineral Dressing Laboratory for continuous-unit testing of metallic and non-metallic minerals. We welcome correspondence or discussion with Cyanamid Field Engineers as a preliminary to testing on your ore, and will be glad to give you the benefit of our test results.

AMERICAN *Cyanamid* COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK



On the Job 24 Hours a Day...After 27 Years!

MILLIONS OF TONS of sulphide ores have gone through this 6 x 12 ft Allis-Chalmers rod mill in 27 years' operation. On the job 24 hours a day, it grinds 87½ tons per hour, reducing ¾ inch crushed ore to 20-mesh ball mill feed. Sturdiness like this can only be the result of sound mill design.

Allis-Chalmers' experience in building over 4,000 grinding mills makes it possible to offer you these modern features:

- **Heavy welded plate shells, fully "stress-relieved" before machining.**
- **Self-aligning trunnion bearings are available with pressure pump for "floating" the mill before starting.**
- **Accurately machined mill heads and shell flanges provide perfect alignment when bolted together.**
- **Trunnions cast integral with heads for severe service. Fewer parts.**

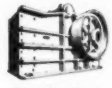
When you choose a grinding mill you'll get top efficiency and economy only if your mill is well-suited to your specific application. Allis-Chalmers builds rod mills, ball mills in both overflow and grate types, pebble mills, and multi-compartment *Ballpeb* and *Compeb* mills in a maximum range of sizes.

Allis-Chalmers mills are available with four types of feeders, three types of drives, a choice of liners and discharge arrangements. This means you'll get the mill that gives you top performance. And Allis-Chalmers furnishes motors, control and V-belt drives—the whole installation from one company.

Sound advice on your grinding problems can be obtained from the A-C representative in your area. Allis-Chalmers offices or distributors are in principal cities in the U.S.A. and throughout the world.

A-2831

Kilns, Coolers, Dryers


Jaw Crushers

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Mills

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AND OTHER EQUIPMENT FOR THE CRUSHING, CEMENT AND MINING INDUSTRIES

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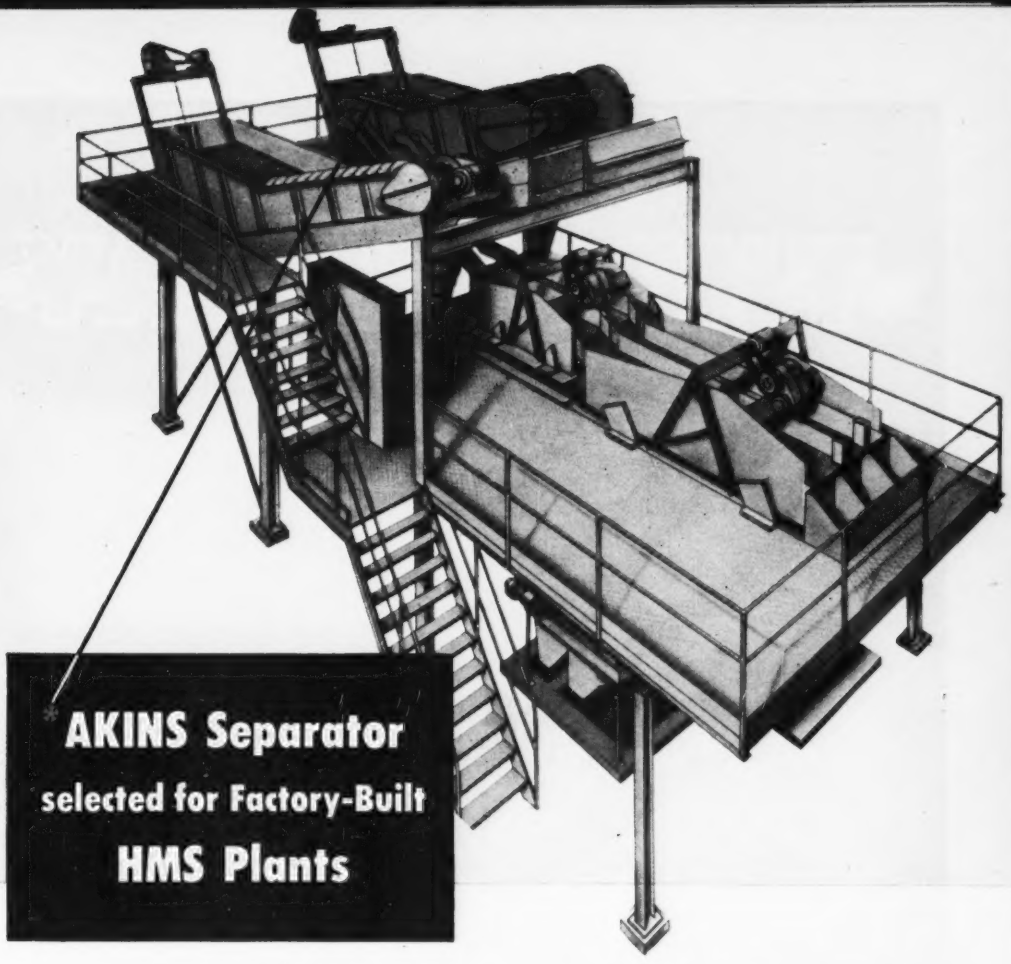
ALLIS-CHALMERS



AKINS Separator selected for Factory-Built HMS Plants

AKINS Separators together with all auxiliary equipment for Heavy Media Separation are now available as complete prefabricated units. These complete Heavy Media plants are built by Southwestern Engineering Company from designs prepared jointly by the Engineering Staffs of SWECO and Colorado Iron Works.

SWECO Plants are the only HMS units capable of producing separate float, middling and sink products — the Akins Separator being the key to this feature. Each plant is completely factory-built and tested before shipment to assure accurate field erection and trouble-free operation. Factory-built plants meet any capacity requirement up to 100 tons per hour. SWECO's Engineering Department also has the necessary data for economically designing custom-built plants when larger capacities are required.

In a SWECO HMS Plant, you get these advantages: Lower capital investment through use of the AKINS Separator. 40% Less installed horsepower because of AKINS equipment. Lower operating cost, higher recovery and a better grade of concentrate than is possible with any conventional existing plant. Field erection supervision service in continental U. S.

The complete story of these plants is told in SWECO Bulletin 902. Write for your free copy to Southwestern Engineering Company, 4800 Santa Fe Avenue, Los Angeles 11, Calif.

NO IMPORTANT INSTALLATION OF AKINS MACHINES HAS EVER BEEN REPLACED BY ANY OTHER MAKE

Write for free engineering service on your beneficiation.

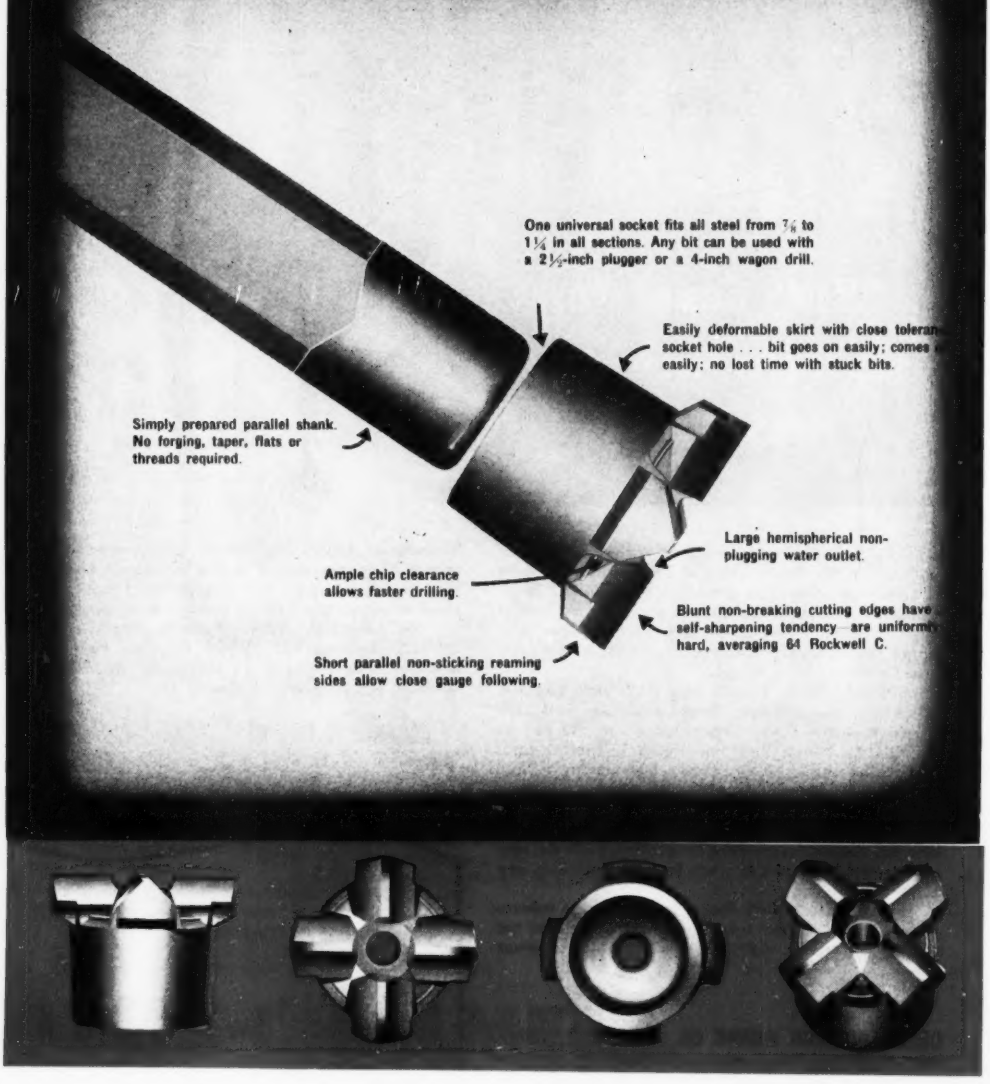
COLORADO IRON WORKS COMPANY

COLORADO IRON WORKS CO., DENVER 2, COLO.

MAIN OFFICE AND WORKS, Denver 2, Colorado, U. S. A., Canadian Locomotive Co., Ltd., Kingston, Ont., Can.; Wright Bros., Credit Foncier Bldg., Vancouver, British Columbia Sales Agents; Head, Wrighton & Co., Ltd., Stockton on Tees, Engl.; John Carruthers & Co., (Pty.) Ltd., Sydney, Aus.; Head, Wrightson & Co., S. A., (Pty.) Ltd., Johannesburg; Edw. J. Nell Co., Manila, P. I.

THROWAWAY

DETACHABLE ROCK BITS


One universal socket fits all steel from 7/8 to 1 1/4 in all sections. Any bit can be used with a 2 1/2-inch plugger or a 4-inch wagon drill.
Easily deformable skirt with close toleran socket hole . . . bit goes on easily; comes easily; no lost time with stuck bits.
Simply prepared parallel shank. No forging, taper, flats or threads required.
Large hemispherical non-plugging water outlet.
Ample chip clearance allows faster drilling.
Blunt non-breaking cutting edges have self-sharpening tendency—are uniformly hard, averaging 64 Rockwell C.
Short parallel non-sticking reaming sides allow close gauge following.

Case History Number 1

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OFFICE MANAGER
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SUP'T OF IDENTIFICATION
JOHN H. MATTHEWS
SUP'T OF JAILS
O. N. DAY
SUP'T ROCKY BUTTE QUARRY

September 8, 1949

Throwaway Bit Corporation
4200 N. W. Yeon Avenue
Portland 10, Oregon

Gentlemen:

In answer to your letter inquiring about results we are getting with your bits after using them for approximately one and one-half years, herewith is a brief history of same in relation to our operations.

From 1922 to 1935, we did all our drilling with conventional steel sharpened by our own blacksmiths and from 1935 on we used a nationally known threaded type of resharpenable bit.

In May 1948 we tested your Throwaway bit and the results were so good that we decided to purchase 4,000 for further confirming tests. These were so satisfactory that we changed over to Throwaway bits completely.

Since then, we have averaged over 25 ft. of hole with each Throwaway bit, while the threaded type averaged about 12 ft. of hole after being resharpened twice.

Average drilling cost with Throwaway bits is $0.008 per foot.

Average drilling cost with previous bits was $0.052 per foot.

Additionally, there was thread breakage to contend with previously, which is entirely absent with your rods. Furthermore, no reconditioning equipment whatsoever is required; neither do bits have to be transported back and forth for resharpening.

I think this will show why we are completely satisfied and why we have changed over to Throwaway bits.

Yours very truly,

O. N. Day

O. N. Day, Superintendent
Multnomah County Quarry

OND:OEB

It is the company's policy to avoid grandiose, unsubstantiated claims and to offer results of actual production runs in well known mines, quarries and contracting projects as these become available. Furthermore, the company's metallurgical laboratory, backed by their field men, is constantly endeavoring to give the industry better, faster, further and easier drilling at lower cost per foot.

Fully descriptive literature is available and competent field engineers are always at your service.

THROWAWAY BIT CORPORATION

4200 N.W. Yeon Ave. Portland, Oregon, U.S.A.

Throwaway Bits, methods of manufacture, etc., and the name Throwaway are covered by patents already issued, applications for patents, design patents, trademarks, etc. Any infringement will be prosecuted to the full.

2½ times as tough as natural rubber

. . . you can't beat it for service!

Drag it behind electric shovels and mining machines, run it on and off reels, use it in the tough spots where rugged duty is encountered . . . you'll find General Electric geoprene-jacketed portable cable, with its extra service life, helps to reduce operating costs.

Standard tests prove that geoprene jackets have 2½ times the tear resistance of natural rubber. Comparison with ASTM test requirements prove its superiority. Insulation for 75 C copper temperature permits maximum power for cable size, keeps weight down. The right number of fine wires in the conductors provides maximum flexibility, easy handling.

ORIGINAL	ASTM REQUIREMENTS	GEOPRENE TYPICAL VALUES
Tensile Strength, lb sq in.	1800	3800
Per cent elongation	300	530
Set in 2-in. test piece, in.	3 8	1 16
After 7 days in Geer oven at 70 C		
Tensile strength, lb sq. in.	1600	3775
Per cent elongation	250	460
After 96 hrs. in oxygen bomb at 70 C		
Tensile strength, lb sq in.	1600	3285
Per cent elongation	250	495
After 18 hrs. in oil at 121 C		
Per cent depreciation in tensile strength	40	40
Per cent depreciation in elongation	49	31
Tear Test		
Tensile strength, min. lb in.	40*	110

* This is the requirement for rubber jackets; no tear value has yet been set for neoprene-type jackets.

In addition to exceptionally valuable physical properties, geoprene has all of the other characteristics desirable in portable cable: superiority to rubber in resistance to heat, sunlight, oil, alkalies, acids and flame. General Electric geoprene-jacketed mine trailing cables carry Pennsylvania Department of Mines Approval No. P-108 for flame resistance.

For full information on the complete range of sizes and types available, write for the General Electric bulletin, *Geoprene Portable Cable*. It's fact-packed with the information you want to know. Just address Section W44-895 *Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.*

G-E Geoprene-jacketed Portable Cables

GENERAL ELECTRIC

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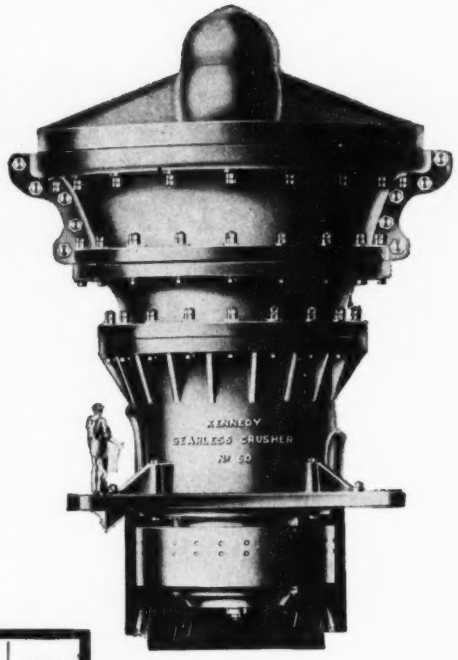
JONES & LAUGHLIN STEEL CORPORATION

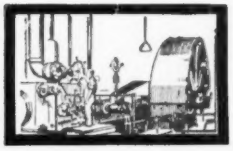
From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

WANT FREE CRUSHING POWER?

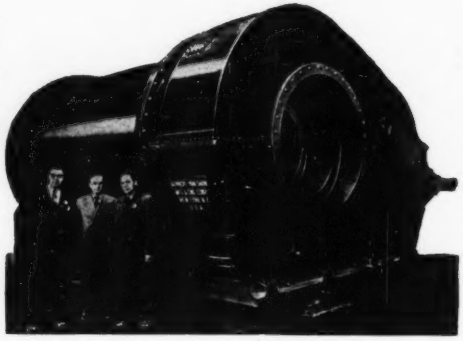


Ever hear of Kinetic energy? It's the extra power that results when a big pulley or flywheel whirls around—like the big pulley on the old Corliss Engine. Well, KINETIC ENERGY is exactly what gives you ADDED FREE POWER in the "KVS" Gearless Crusher, for no added cost. We whirl a BIG pulley in the KVS Gearless! It whirls around at a speed of 3,500 ft. pr minute—and what EXTRA crushing energy or crushing power you get! What's more, the 8-ton pulley (used in a KVS Crusher weighing 400,000 lbs.) whirls so easy you can turn it WITH TWO FINGERS! If there were a bevel gear between the eccentric and the pulley, it would take SIX MEN with crowbars to turn it. In short, more CRUSHING for LESS POWER COST, is the idea that puts KVS way out in front, and keeps it there!



• *Send for the* **NEW "KVS" BULLETIN**

WANT TO SAVE $6,000?



Say you're buying a 10 ft. tube or ball mill. And suppose you decide on a "KVS" with integral gear drive. The Kennedy INTEGRAL GEAR DRIVE enables motor to be DIRECT CONNECTED to driving shaft. Shaft is carried in roller bearings that CANNOT be misaligned or set wrong. The pinion shaft to which the motor is connected runs at approximately 600 r.p.m. while other pinion shafts run at about 180 r.p.m. ON A 10 ft. MILL THIS ENABLES YOU TO PURCHASE THE SYNCHRONOUS MOTOR AT A SAVING OF ABOUT $6,000. Another point to remember is—"KVS" trunnions on large sized tube and ball mills are CARRIED ON OIL. The bearing never wears out, uses little power. All gears and bearings are automatically sprayed with oil before tube mill is started (Design patented). Believe it or not, in 15 years no "KVS" gears or pinions have worn out on this type mill.

"THE PRODUCTS WITH THE TROUBLES LEFT OUT...

WANT TO BE CONVINCED?

SPEAKING OF CRUSHING . . . .

LOCATION: NATIONALLY KNOWN MINING CO.
NEW YORK STATE

CRUSHERS: FOUR NO. 37½ KENNEDY TYPE "S"
ROLLER BEARING GYRATORY CRUSHERS

FEED OPENING: 6¼"; **DIAMETER OF HEAD:** 3 FEET

DISCHARGE SETTING: 7/32" CLOSED SIDE AT HEAD

CAPACITY EACH CRUSHER:
56 TONS PER HOUR

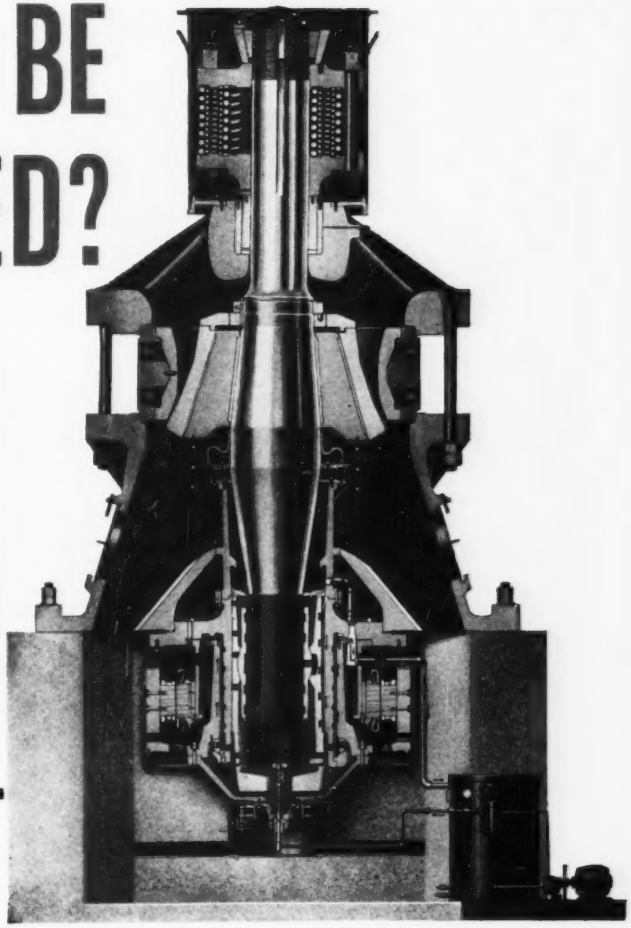
HORSEPOWER EACH CRUSHER: 48 HP.

CLOSED CIRCUIT OPERATION
GRADATION AS FOLLOWS:

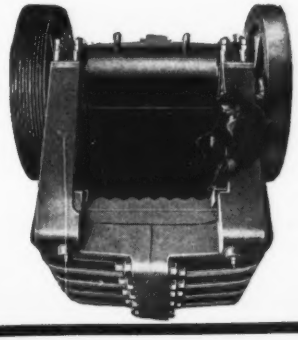
THE FIGURES!

99.8%	Minus	3	MESH
93.3	"	4	"
80.6	"	6	"
66.6	"	8	"
56.1	"	10	"
48.1	"	14	"
40.6	"	20	"

Can You Equal These Figures?



WANT TO KNOW HOW?

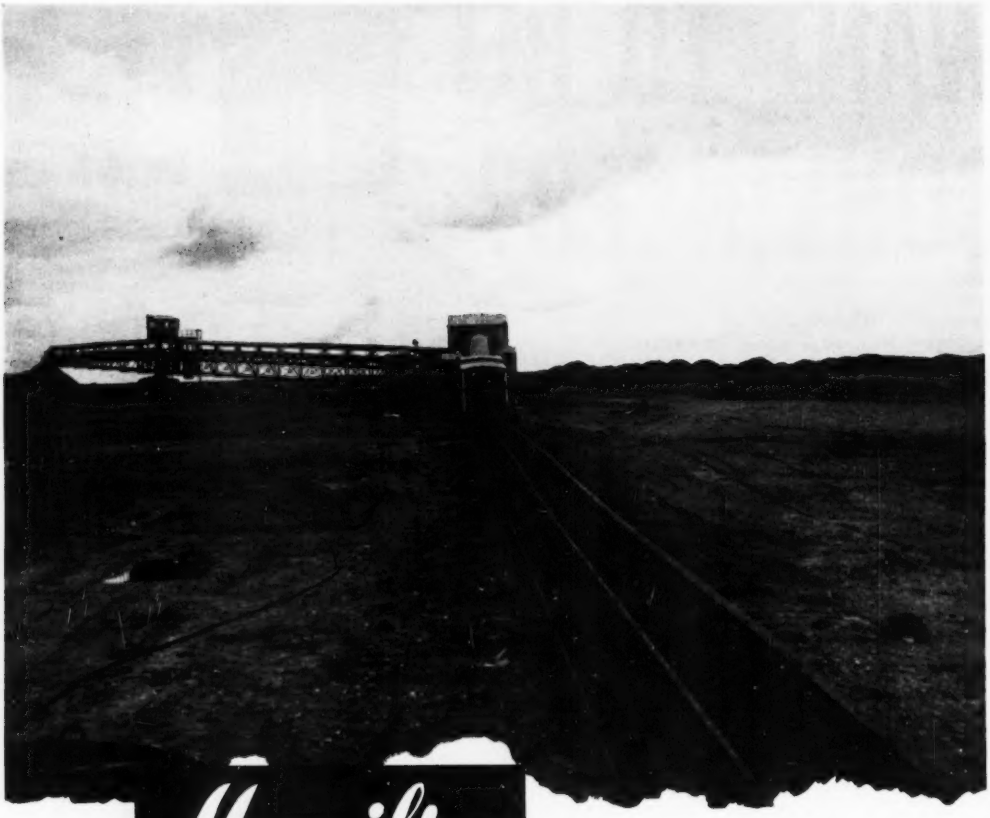


How can the "KVS" Swing Jaw Crusher do MORE crushing and yet use LESS POWER than ordinary swing jaw crushers? Well, we'll tell you. The angle of both swing jaw and stationary jaw is THE SAME. Stationary jaw carries fully 50 percent of load . . . result, you need LESS POWER to keep the swing jaw swinging and crushing. Note another thing—the swing jaw is all ONE PIECE, except renewable crushing plate. Also swing and stationary jaws are interchangeable, both the same length, and reversible end-for-end, giving twice as much crushing life before renewal is needed.

Kennedy-Van Saun
MANUFACTURING AND ENGINEERING CORPORATION

2 PARK AVE., NEW YORK 16, N. Y.

FACTORIES:
DANVILLE, PA., U.S.A.
CANADA, ENGLAND, FRANCE, AUSTRALIA



Hamilton
RUBBER PRODUCTS

Meet the Rugged Specifications of the Iron Range:

Here—a big, rugged job being done by HAMILTON Belting! At this Minnesota mine 85,000,000 cubic yards of overburden are being removed.

Throughout all industry HAMILTON Rubber Products are known for their wear-ability, performance, and economical cost. You also can save by using HAMILTON Products.

Send for our Catalogue #EM.

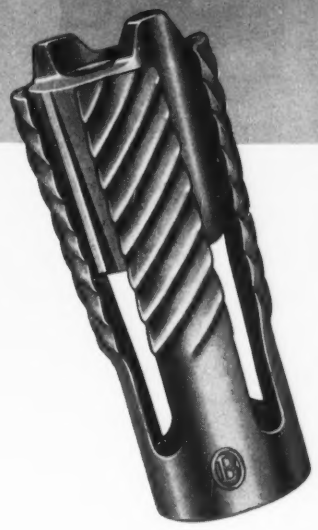
1870

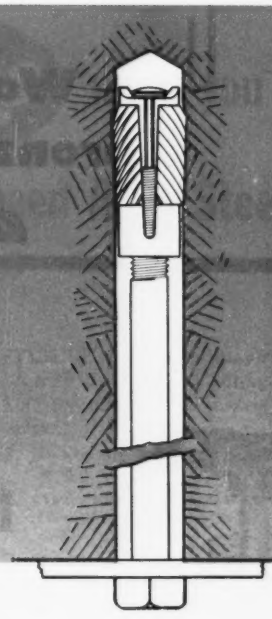
HAMILTON RUBBER MANUFACTURING CORP.
TRENTON · NEW JERSEY

NEW YORK CHICAGO PITTSBURGH INDIANAPOLIS HOUSTON LOS ANGELES SAN FRANCISCO

NEW

O-B EXPANSION SHELL AND PLUG FOR ROOF BOLTING!





- Develops full tensile strength of ¾ and ⅝-inch bolts or rods.
- Has double the expansion of standard expansion shells.
- Quickly and easily installed.
- Expansion unit does not have to bear against top of hole.
- Used with bolts, allows bolt-head to be flush with plate--with rods, can be positioned to provide minimum roof projection.
- For complete information and installation instructions, just fill in the coupon below.

Ohio Brass MANSFIELD, OHIO

FOR MORE INFORMATION

OHIO BRASS COMPANY, MANSFIELD, OHIO

I'd like further information on the new O-B Expansion Shell and Plug for roof bolting. Please send me a copy of bulletin 858-M.

Name .....

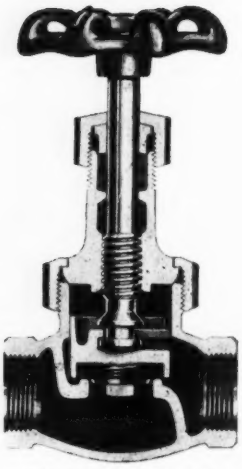
Title .....

Company .....

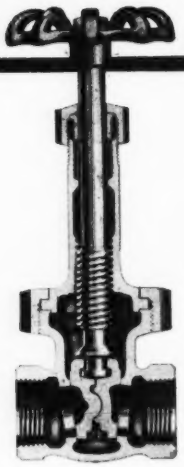
Address ..... Zone ..... State .....

City .....

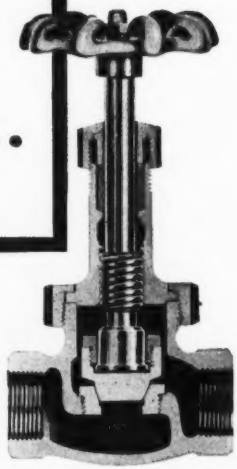
Walworth bronze valves...



Walworth No. 95 Globe Valve
Re-New-Disc



Walworth
No. 29 Gate Valve



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc

built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:

WALWORTH
valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Why it pays to *Call us* when you need Alloy Steels

THERE are three major reasons why it's to your advantage to "Call Us" for all your alloy steel requirements:

1. **You're sure that your orders will be filled quickly and efficiently.**
2. **You're sure of getting steels that are manufactured to a *Guaranteed Minimum Hardenability.***
3. ***You get a valuable metallurgical service.*** **This means that you get a Heat Treatment Guide with *each* shipment, containing specific data on the composition, potential physical properties and recommended heat treatment temperatures. This helps you get the maximum performance from the U·S·S Carilloy Steels supplied on your orders.**

Yes, it pays you to "Call Us" when you need alloy steels. Our nearest warehouse or sales office is constantly at your service. So, phone, wire or write for prompt action. Meanwhile, your requests for literature will receive immediate attention. Just fill in and return the coupon. There's no obligation.

United States Steel Supply Company
Dept. P-109, 208 S. La Salle St., Chicago 4, Ill.
Without obligation on our part, please send us FREE booklets on U·S·S Carilloy Steels.

Name.....Title.....
Firm Name.....
Address.....
City.....Zone....State.....

UNITED STATES STEEL SUPPLY COMPANY STEELS SERVICE

SYMBOL OF SERVICE FOR STEEL USERS

UNITED STATES STEEL SUPPLY COMPANY

Warehouses: BALTIMORE · BOSTON · CHICAGO
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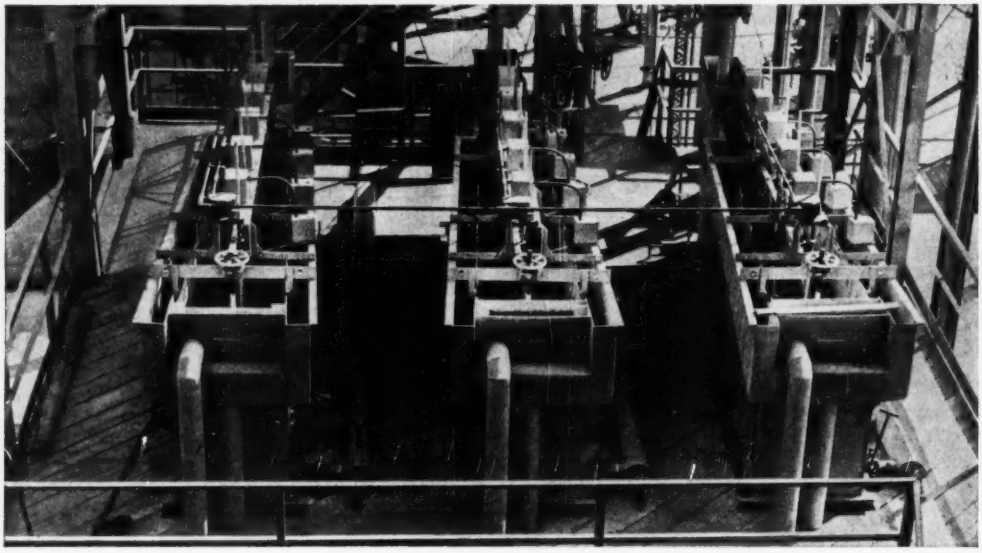
Also Sales Offices at: KANSAS CITY, MO. · PHILADELPHIA · TOLEDO · TULSA · YOUNGSTOWN
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

UNITED STATES STEEL

for ***accurate classification*** according to . . .

1 SIZE AND DENSITY

2 OR SIZE ONLY



THE DORRCO SIZER

Operating on the "hindered settling" principle, the Dorrco Sizer is a versatile hydraulic Classifier, which greatly magnifies the differences in settling rates between particles of varying sizes and specific gravities. Containing from 4 to 8 pockets, it is uniquely designed to grade any feed composed of particles ranging from 4 mesh to 200 mesh with extreme fines passing out in the overflow.

In ore dressing the Dorrco Sizer . . .

1 Produces the perfect feed for concentrating tables and spirals by collecting large particles of low specific gravity and smaller particles of higher specific gravity together in the same pocket.

2 Classifies according to particle size when handling a feed of mixed sizes but of the same specific gravity.

SIMPLE CONTROL

FULLY AUTOMATIC

ACCURATE SIZING

EASY CLEANOUT

LOW COST

If you have a sizing problem involving:

- Iron Ore
- Phosphate Rock
- Ilmenite
- Lead & Zinc Ore
- Chromite & Vanadium
- Glass and Foundry Sand

one of our engineers will gladly show you how the Dorrco Sizer will fit into your flowsheet . . . on a dollar-saving basis.

DORRCO

THE DORR COMPANY, ENGINEERS
570 LEXINGTON AVE., NEW YORK 22, N. Y.
ATLANTA • TORONTO • CHICAGO
DENVER • LOS ANGELES
RESEARCH AND TESTING LABORATORIES
WESTPORT, CONN.
SUGAR PROCESSING
PETREE & DORR DIVISION, NEW YORK 22, N. Y.
ASSOCIATES AND REPRESENTATIVES
Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World. Names and Addresses on Request.

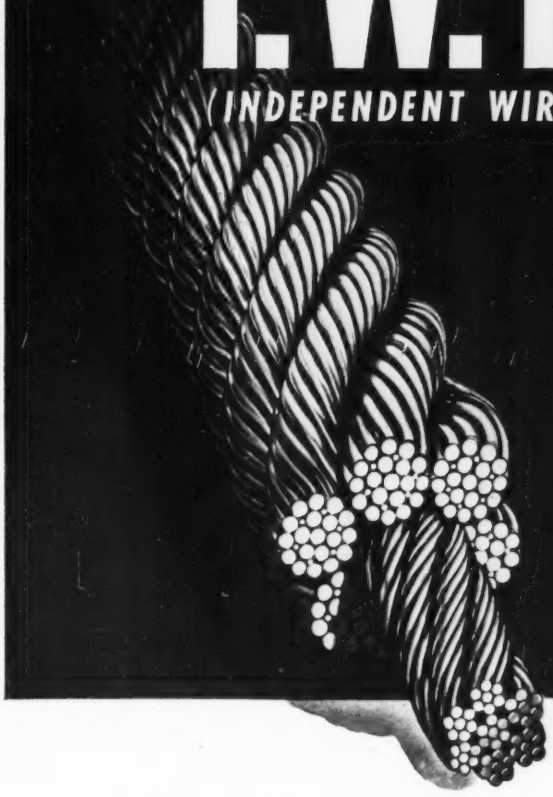
RESEARCH DORR

JR ROEBLING

WHEN TO SPECIFY

I.W.R.C.

(INDEPENDENT WIRE ROPE CORE)



Preformed "Blue Center" Wire Rope

PERFORMANCE-PROVEN IN MINING SERVICE

IN THE TOUGH SPOTS, rope with an Independent Wire Rope Core gives best and longest service! I.W.R.C. is outstanding where operating pressures are high; where heat resistance, additional strength, or minimum stretch are essential. But remember this . . . *the same features that make* I.W.R.C. *best for the tough spots help make it the longest-performing and most economical choice for many applications!*

In strip mining, for shovel hoist and draglines, Roebling Preformed "Blue Center" Wire Rope with I.W.R.C. is a must for small and medium size equipment, and many operators prefer it on the larger 20- to 40-yard machines. For mining machines, the same rope in Regular Lay will give you outstanding performance.

Have your Roebling Field Man help select the *right* rope for your special requirements. John A. Roebling's Sons Company, Trenton 2, New Jersey.

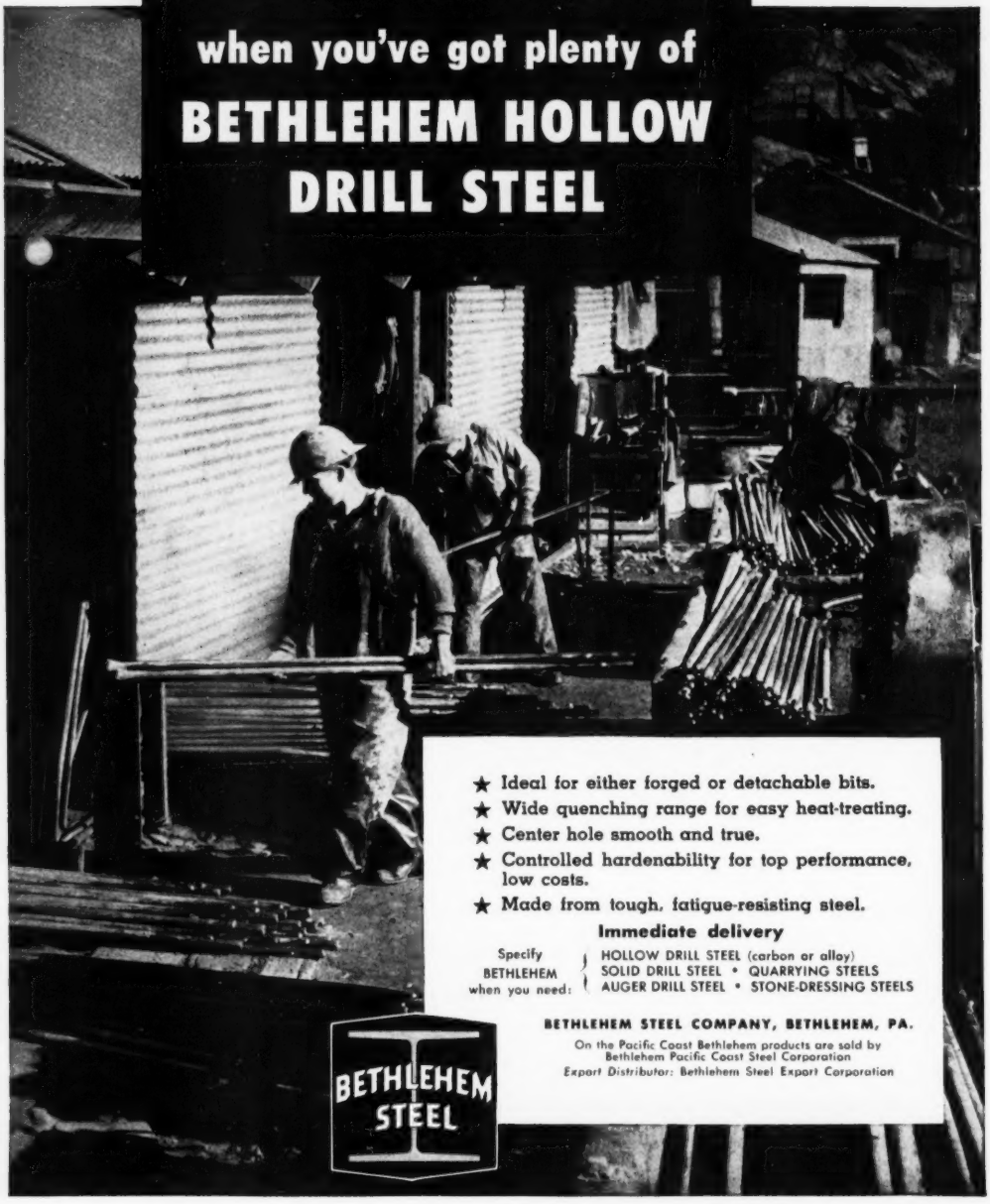
WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. ★ ***Boston,*** 51 Sleeper St. ★ ***Chicago,*** 5525 W. Roosevelt Rd. ★ ***Cleveland,*** 701 St. Clair Ave., N. E. ★ ***Denver,*** 1635 17th St. ★ ***Houston,*** 6216 Navigation Blvd. ★ ***Los Angeles,*** 216 S. Alameda St. ★ ***New York,*** 19 Rector St. ★ ***Philadelphia,*** 12 S. 12th St. ★ ***Pittsburgh,*** 855 W. North Ave. ★ ***Portland, Ore.,*** 1032 N. W. 14th Ave. ★ ***San Francisco,*** 1740 17th St. ★ ***Seattle,*** 900 First Ave.

ROEBLING

☆ *A CENTURY OF CONFIDENCE* ☆

Good Drilling Ahead


when you've got plenty of
BETHLEHEM HOLLOW
DRILL STEEL
★ Ideal for either forged or detachable bits.
★ Wide quenching range for easy heat-treating.
★ Center hole smooth and true.
★ Controlled hardenability for top performance, low costs.
★ Made from tough, fatigue-resisting steel.
Immediate delivery
Specify BETHLEHEM when you need:
HOLLOW DRILL STEEL (carbon or alloy)
SOLID DRILL STEEL • QUARRYING STEELS
AUGER DRILL STEEL • STONE-DRESSING STEELS
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation
BETHLEHEM STEEL

These 7 Great Features Add Up To LONG V-BELT LIFE

1 *Powerful Cord Structure* built up of hard-twisted, high tensile strength cords, impregnated with live rubber compound to prevent chafing and heating.

2 *Thick, Resilient Cushion* of rubber supports cord structure at correct pitch line . . . absorbs shocks . . . helps dissipate heat.

3 *Tough, double-wrapped cover* of long staple fibres, bias cut for elasticity and impregnated with rubber. Protects cords . . . seals out dust, grit, moisture.

4 *Extra Stiffening Plies* of heavy fabric and rubber help keep the belt square in the groove.

5 *Precision Molded And Cured* in accurate steel dies. Gives belt the *straight* sides necessary to provide the bulging gripping action that all V-belts need.

6 *Every Belt Carefully Weighed* and inspected during construction. Assures perfect balance and uniformity.

7 *Accurate Set Matching* . . . Every finished belt measured while running under load. *Texrope* multiple V-belts are matched in sets to assure uniform load on each belt.

COMPLETE V-BELT SERVICE

Get everything you need for your V-belt drives . . . V-belts, standard and variable pitch sheaves and speed changers . . . from one reliable source. 144 page *Texrope* Pre-engineered Drive manual covers 90% of requirements. Get your copy today from your A-C Authorized Dealer or Sales Office or write for Bulletin 20B6956. Also in Sweet's.

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

Super-7 *Texrope* V-Belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices. A-2836

Texrope and ***Super-7*** are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

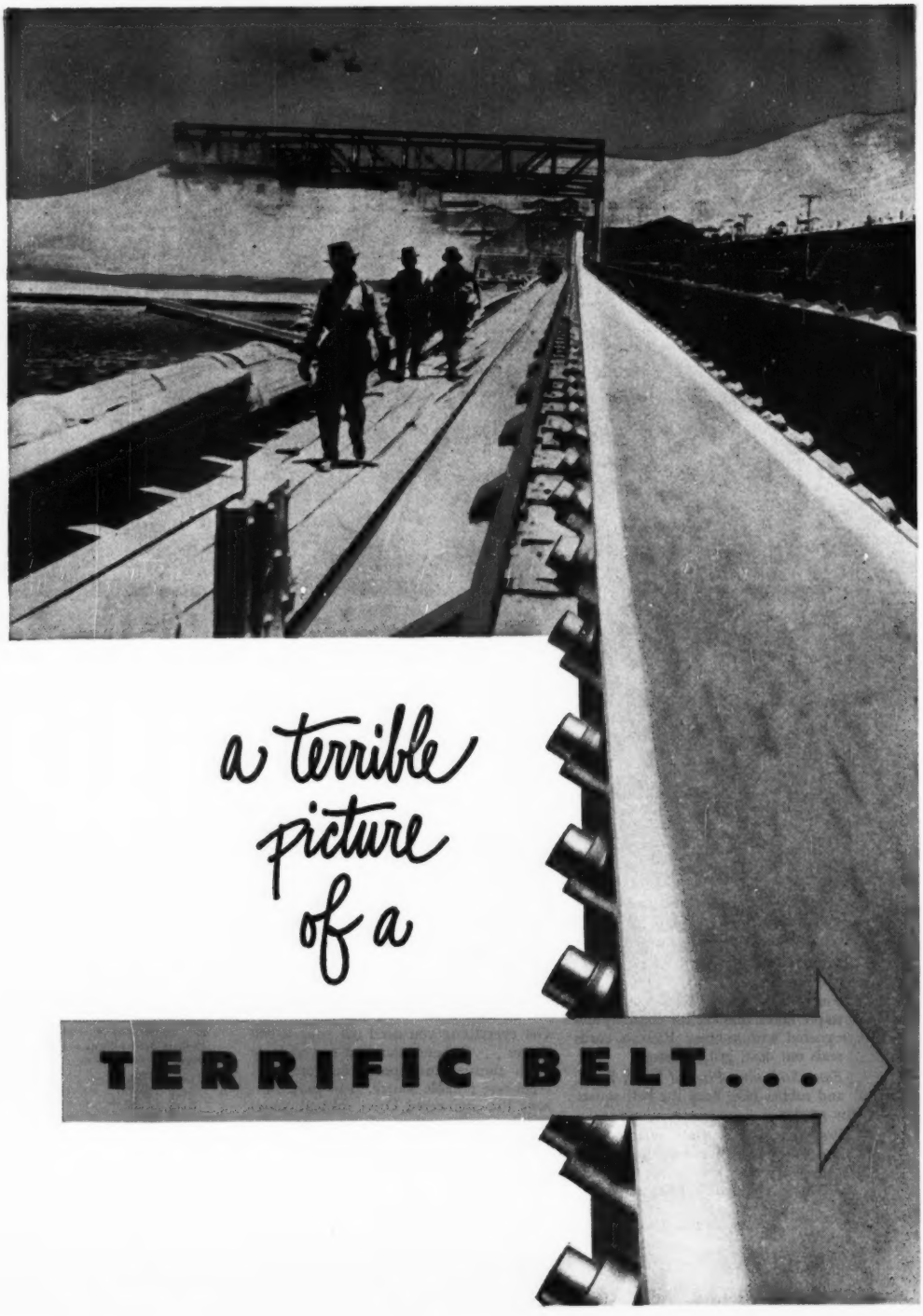
by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

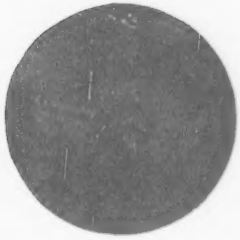
MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

ALLIS-CHALMERS


a terrible
picture
of a
TERRIFIC BELT...



THE BLINDING GLARE OF A BLAZING CHILEAN SUN

ruined this photo but has had little effect on the belt itself.

In northern Chile, blistering sun blazes the year round. Rubber takes the worst kind of punishment. Yet this U. S. Matchless Conveyor Belt has given continuous trouble-free service since March, 1939.

The Belt has already carried over 90 million tons of abrasive copper ore. It is expected to carry at least 100 million before replacement.

Performances like this under the most trying conditions are the result of 3-way engineering-teamwork between engineers representing mine operators, designers of conveyor equipment, and United States Rubber Company.

Whatever your materials handling problem, call in a United States Rubber Engineer. Write to Mechanical Goods Division, United States Rubber Company, 1230 Avenue of the Americas, New York 20, N. Y.

"Best I could do with my equipment" ... was the apology that accompanied this belt photo from Chile... ***"The sun was too hot—the glare too bright"***—but that's what makes the story behind this belt so amazing.

This U. S. Matchless Conveyor Belt is 3,100 feet long, 60 inches wide; has plies of 42 oz. duck, ¼-inch and ⅛-inch covers.

A PRODUCT OF

U.S.RUBBER

SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

Meet metal with mettle

IT PAYS to use Bucyrus-Eries on the digging jobs that offer the toughest tests. That's the reason why Bucyrus-Eries are so often the choice of mine operators for the important ore-loading assignment. They know that the speed, dependability, and durability of these machines shows up in extra tons of ore loaded per shift . . . per month . . . per year. They know that depending on a Bucyrus-Erie is banking on real shovel *mettle* to keep ore on the move toward greater production.

Investigate Bucyrus-Erie excavators for the machine you need to solve your loading problems.

BUCYRUS ERIE

The BEST buy Bucyrus, the best BUY in excavators

Bucyrus-Erie Company

SOUTH MILWAUKEE, WISCONSIN

156E49

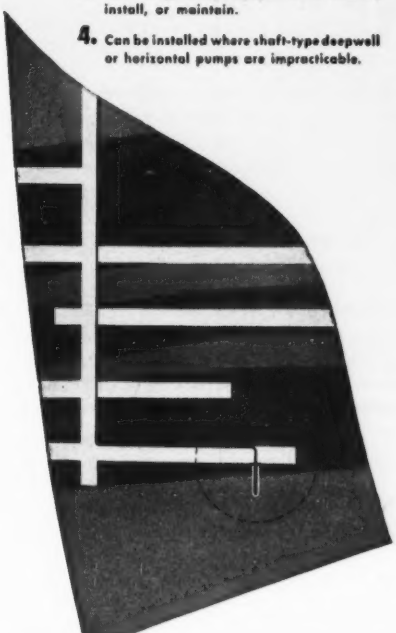
Mine protection starts *down deep*

a BJ *submersible*

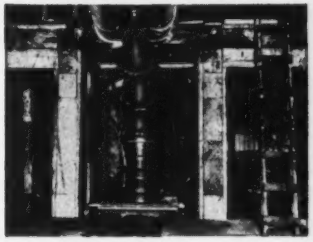
cannot be damaged by flooding

Here are 4 important BJ Submersible advantages:

1. Close-coupled motor pump unit operates completely submerged.
2. No danger from flooding or cascading water.
3. No heavy, bulky equipment to handle, install, or maintain.
4. Can be installed where shaft-type deepwell or horizontal pumps are impracticable.



MORE AND MORE OPERATORS are installing Submersibles as the best pumping insurance against flood damage. The Submersible operates completely submerged in water because of the BJ close-coupled motor-pump design. Controls are out of reach of flood waters. There are no long line shafts with innumerable bearings to install and maintain. These are replaced by the marine power cable.



THE COMPLETE PUMPING UNIT can be hung in the shaft, submerged in a collection sump, or placed at the best water pick-up point. Discharge can be to surface, to other mine levels, or to abandoned workings. The Submersible replaces other more complicated horizontal and standby booster pump stations. A single pump can lift up to 1500 feet or handle capacities up to 5000 gpm. Greater lifts and capacities can be provided by combining two or more Submersibles in the same mine shaft or on a single discharge line. Write us today for further details.

1. *Pump and motor can be set at any desired depth from 50 to 1500 feet. Can be installed in a corner of the shaft. Requires very little space.*

2. *Pumping element is directly connected to motor. Number of stages governed by lift required.*

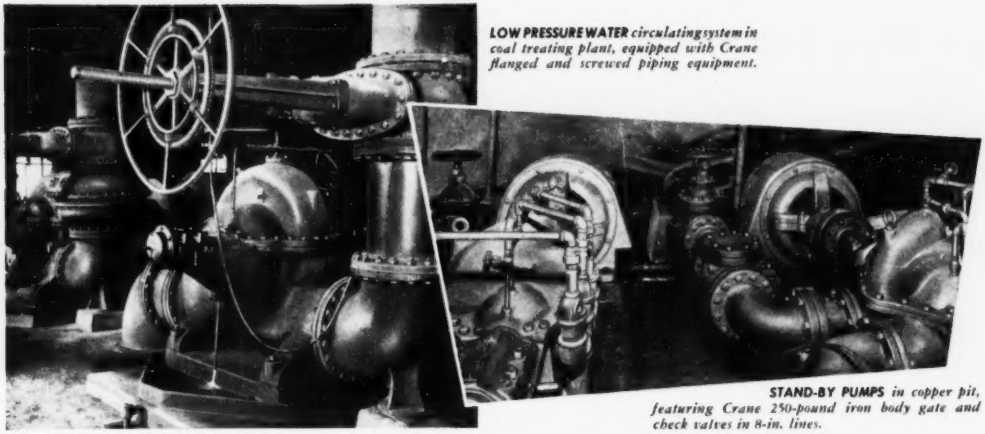
3. *Submersible motor, completely enclosed, has marine cable to surface. Available in sizes from 10 hp to 400 hp.*

Byron Jackson Co.

Established 1872

LOS ANGELES 54, CALIFORNIA

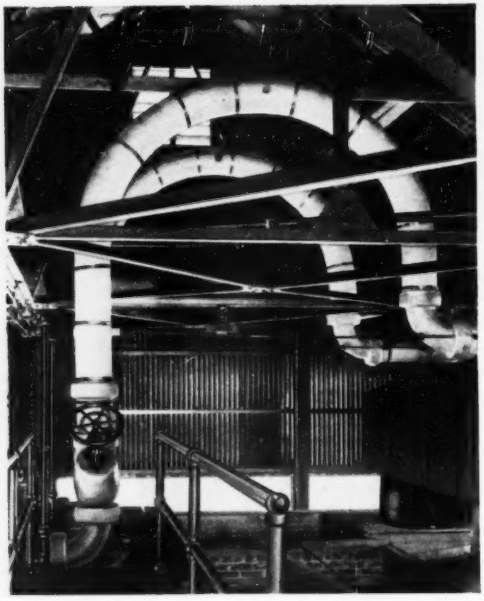
Offices in Principal Cities



LOW PRESSURE WATER *circulating system in coal treating plant, equipped with Crane flanged and screwed piping equipment.*

STAND-BY PUMPS *in copper pit, featuring Crane 250-pound iron body gate and check valves in 8-in. lines.*

Choose CRANE for complete selection on every mine piping job



POWER PLANT *in a zinc mine, showing Crane fabricated steam header piping and Crane stop-check valves on boilers.*

ONE SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

Look *first* to Crane for piping equipment . . . and save yourself the trouble of looking further. Your Crane Catalog contains the world's most complete line of quality valves, fittings, pipe and pipe line accessories . . . in brass, iron, steel and corrosion-resistant alloys. One order—through your local well-stocked Crane Branch or Wholesaler—covers every piping item needed for the job.

The unmatched completeness of this **Single Source of Supply** can simplify every piping procedure for you—from design to erection to maintenance work. **One Responsibility** for all materials helps to get better installations, with less chance for delays. **High Quality** in every item in the broad Crane line assures dependable performance throughout your entire piping system.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

EVERYTHING FROM . . .

VALVES
FITTINGS
PIPE

CRANE

PLUMBING
AND
HEATING

FOR EVERY PIPING SYSTEM

P&H PROVIDES THE PROOF

P&H Model 1455 14 years service at The Steep Rock Iron Mines — Ont., in Canada.

—IN ONE LOCATION AFTER ANOTHER

The second P&H Electric shovel was on the job at Steep Rock within less than a year.

Why are more and more large operators reordering P&H Electric Shovels? The reason is clear — lower operating costs. They've piled up the proof with Added Values like these:

1. *"Magnetorque"* Drive*— hoists the dipper with electro-magnetic power — lowers with less than half the usual inertia to overcome. It's faster.
2. *"Magnetron" Control*—entirely eliminates control fingers and contactors. It's simpler, more dependable.
3. *Independent Propel*—eliminates sliding gears, brakes, clutches and their controls — provides faster move-up.
4. *Air-filtered cab*—pressurized to allow only clean, fresh air to enter — no dust to damage electrical equipment.

Yes, proof on the job makes P&H the choice of discriminating buyers — leads to one repeat order after another. Investigate before you invest.

* T. M. of the Harnischfeger Corporation for Electro-Magnetic Type Clutch

P&H

ELECTRIC SHOVELS
4454 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION
EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

Every third P&H Electric Shovel sold is a repeat order

LEADING THE FIELD IN ELECTRIC SHOVEL DEVELOPMENT

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Z-5 POTASSIUM AMYL

Z-6 POTASSIUM PENTASOL AMYL

Z-8 POTASSIUM SEC. BUTYL

Z-9 POTASSIUM ISOPROPYL

This series of fine collectors is continually being developed and expanded to meet the problems of ore concentration throughout the world. We invite your inquiries concerning flotation concentration.

GREAT WESTERN DIVISION

THE DOW CHEMICAL COMPANY

SAN FRANCISCO 4, CALIFORNIA, U. S. A.

PIONEER PRODUCERS OF XANTHATES FOR METALLURGICAL USE

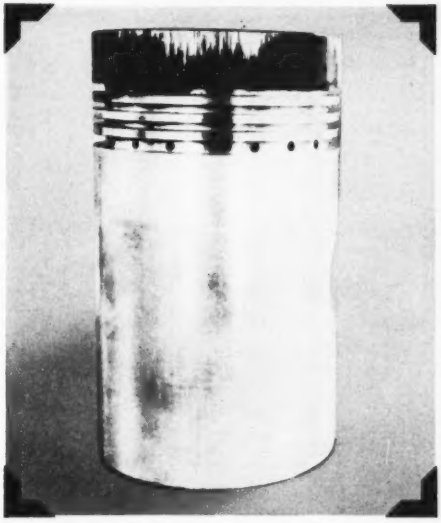
STANDARD ENGINEER'S REPORT

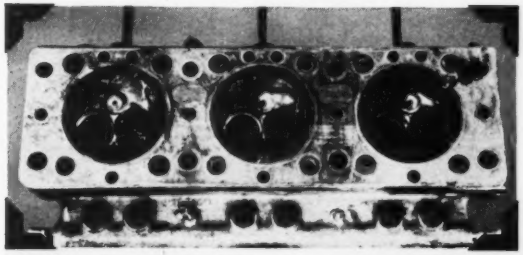
RPM DELO

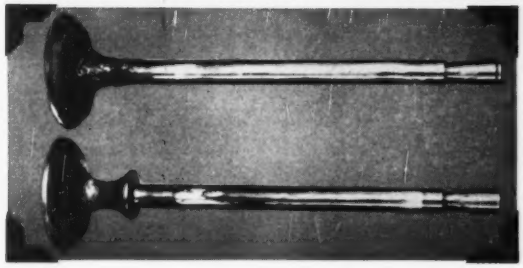
TEST DATA

LUBRICANT	RPM Delo Supercharged Lub. Oil
UNIT	Caterpillar Diesel - D13000 5¾×8"
CONDITIONS	Cont. high load - Pumping water
FUEL	Regular commercial Diesel fuel
TEST PERIOD	4 Months
LOCATION	Coolidge, Arizona

CYLINDER WEAR REDUCED 75% BY NEW LUBRICATING OIL







RPM DELO SUPERCHARGED LUBRICATING OIL held cylinder wear to 0.0007 inches per 1000 hours in a stationary Diesel where ordinary heavy-duty type oil had allowed over four times more wear, or 0.0031 inches. The piston, head, and valves above, photographed after they had operated in the engine 965 hours under severely accelerated conditions on RPM DELO Supercharged, are typical of the excellent condition of parts and cleanliness maintained throughout the engine by this newly developed oil. All piston skirts were varnish-free, all oil-return holes open. Average ring-gap increase per 1000 hours was reduced from 0.01625 inches to 0.00350 by the use of RPM DELO Supercharged Lubricating Oil.

REMARKS: This new product in the RPM DELO line is specially compounded to solve ring-sticking, deposit formation, and excessive wear problems in Diesel engines operating in extra hard service. Many field tests have proved it to be particularly valuable where continuous high loads or high-sulphur content Diesel Fuels cause these conditions.

In the test reported here, the engine ran the full 965 hours at approximately 90% of governed full load engine rating. Drain periods were extended to 240 hours, however all 24 piston rings remained free, no troublesome deposits formed in the ring belt or on other parts, and oil compound depletion was negligible.

Besides providing unusual resistance to oxidation, the compounds in RPM DELO Supercharged Lubricating Oil clean existing gum and lacquer from parts, prevent internal rusting and bearing corrosion and stop oil foaming.

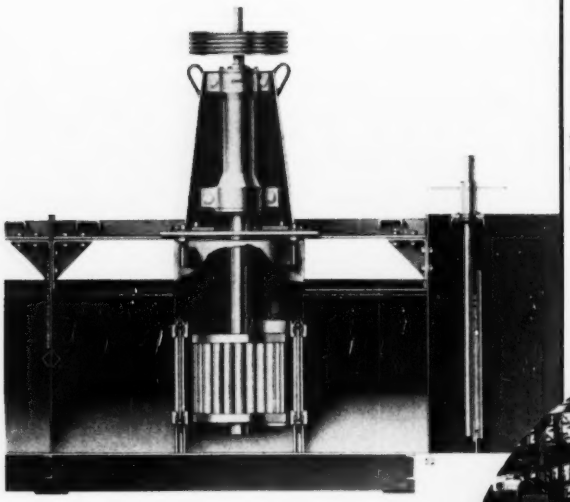
STANDARD OIL COMPANY OF CALIFORNIA • San Francisco
THE CALIFORNIA OIL COMPANY • Barber, N.J., Chicago, New Orleans
STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA COMPANY • Denver, Colorado

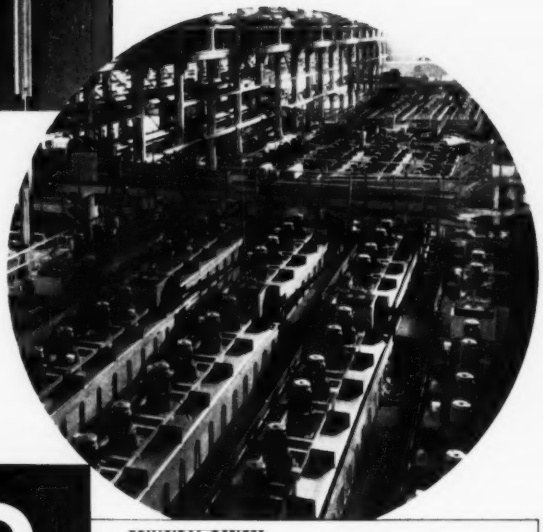
11 REASONS

why Fagergren Flotation Machines are **Best for Flotation**

The Fagergren Flotation Machine is superior in meeting **all** of these flotation requirements.

1. *Higher metallurgical capacity.*
2. *Higher speed of float.*
3. *Greater dispersion of more bubbles to give more total bubble surface area.*
4. *Higher metallurgical recovery—lower tailings.*
5. *Greater capacity per unit of cell volume.*
6. *Lower H. P. per ton of ore treated.*
7. *Lower initial cost per ton capacity.*
8. *Less floor space per ton capacity.*
9. *Lower maintenance costs with all-rubber wearing parts.*
10. *Lower reagent consumption.*
11. *High efficiency for entire life of machine.*





The outstanding performance of Fagergren Flotation Machines in fulfilling each of these requirements accounts for their world-wide use in both the metallic and non-metallic fields.

For data in support of the above or for experienced field service, consult the WEMCO office nearest you.

WEMCO

WESTERN MACHINERY COMPANY

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WKE (HMS) Mobil-Mill • Coal Spiral • Standard Thickeners (HMS) Thickeners • (HMS) Media Pumps • Hydroseparators (HMS) Densifiers • (HMS) Separatory Cones • "SH" Classifiers Sand Pumps • Conditioner and Agitators • Fagergren Flotation Machines • Dewatering Spirals • (HMS) Laboratory Units

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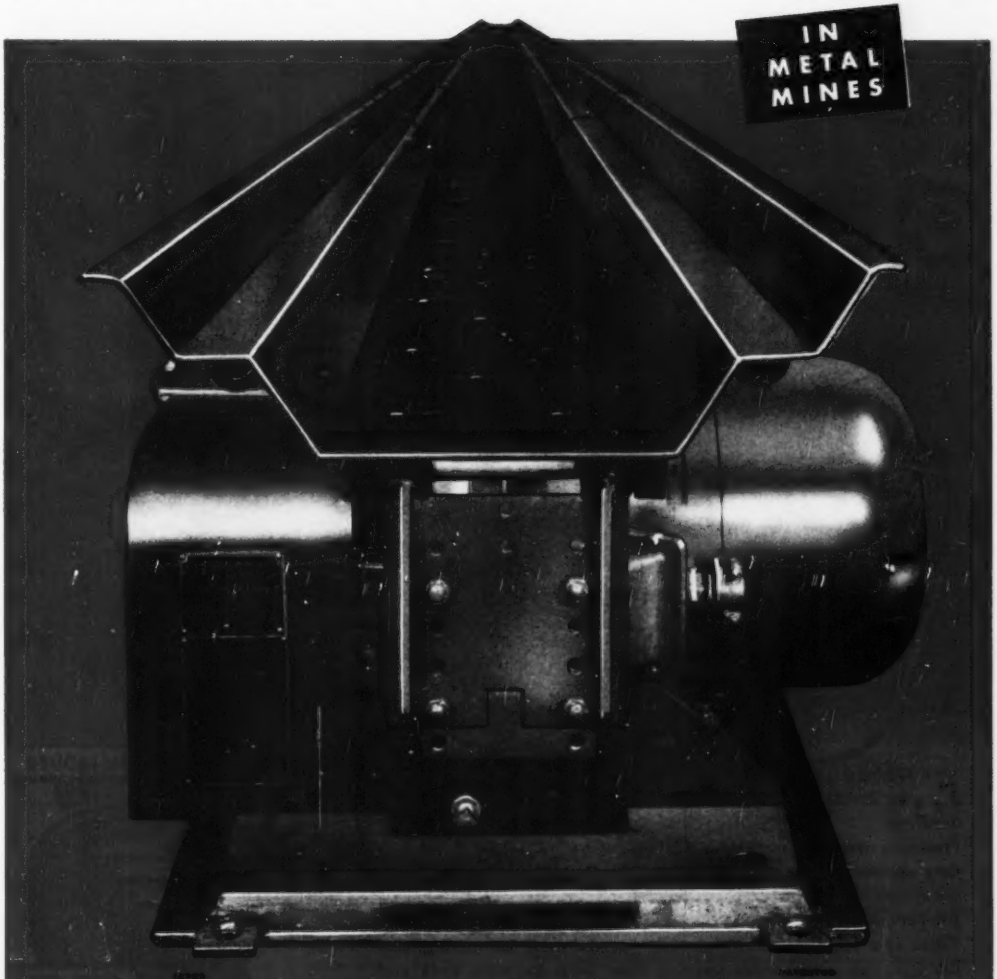
GOODMAN SHAKER CONVEYORS



Goodman shaker conveyors will transport ore

- in any size—from fines to lump
- in any condition—wet, sticky or dry

in a steady flow, without continual attention of an operator.

HALSTED ST. AT 48TH GOODMAN MANUFACTURING COMPANY CHICAGO 9, ILLINOIS

EVERY contractor knows that profits on a job go up as downtime goes down. You make more money when you meet or beat the deadline.

Firestone tires have cut the downtime on thousands of jobs because they are the toughest tires built . . . because Firestone Service is always on hand to keep them on the job . . . we call it "On-the-Job-Service."

There is a specially built Firestone tire for every off-the-highway job . . . the tough, extra traction Rock Grip for rock work and strip mining; the Ground Grip for traction power in dirt or soft going; the Earth Mover for maximum flotation under big loads on free rolling wheels.

Ask your Firestone Dealer or Firestone Store to give you the complete information on Firestone Off-the-Highway tires. Let him prove to you that he can cut your downtime and increase your profits. When you buy new tires or new equipment, specify Firestone Tires.

Listen to the Voice of Firestone every Monday evening over NBC

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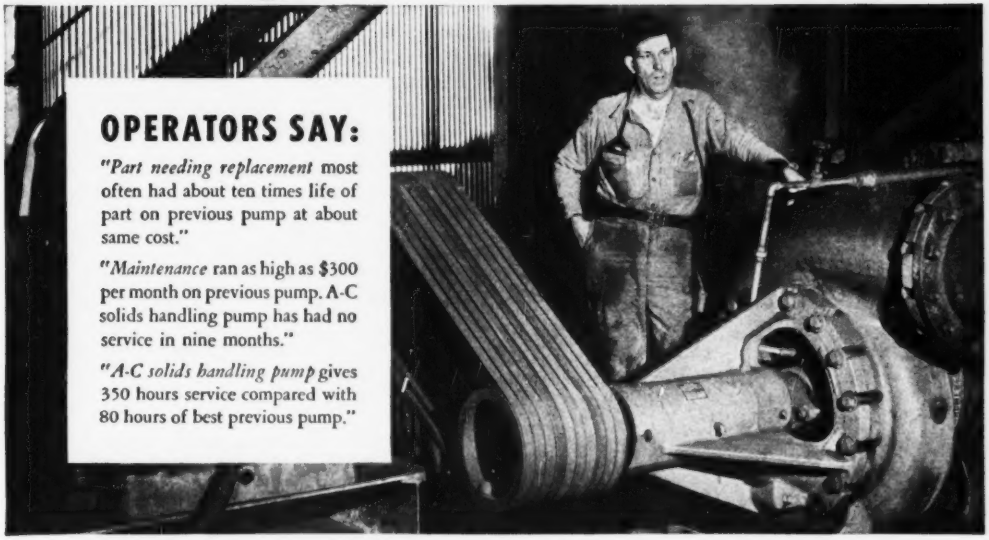
Because THEY DO THE JOB
and STAY ON THE JOB!

SOLIDS PUMP EXPERIENCE PROVES

Long Parts Life!



OPERATORS SAY:

"Part needing replacement most often had about ten times life of part on previous pump at about same cost."

"Maintenance ran as high as $300 per month on previous pump. A-C solids handling pump has had no service in nine months."

"A-C solids handling pump gives 350 hours service compared with 80 hours of best previous pump."

REPLACE WORN PARTS IN HALF HOUR

YOU CAN GET the two things that metallic and non-metallic material processors want most in solids-handling pumps. Allis-Chalmers solids-handling pumps give you longer life between servicings and they make it easy and economical to replace parts.

Allis-Chalmers solids-handling pumps are designed with extra strong parts, built of *Allisite*, a special abrasion-resistant alloy, and application-engineered by experts with many years of experience in solids-handling pump problems.

SAVES ON REPAIR TIME

When parts must be replaced, as they must in all types of solids handling pumps, the Allis-Chalmers solids handling pump will save you hours of labor, cut down-time to a minimum and lower repair costs.

This pump can be dismantled and reassembled in a half hour without disturbing piping. Parts with varying rates of wear are separated. Only those actually worn are replaced. Three sets of bearings, brackets and shafts cover all pump sizes, reducing parts inventory as much as 2/3.

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

GET THE FACTS

Discuss your solids-handling equipment problems with an Allis-Chalmers pump engineer. He can show you dollars and cents savings you can make. Contact your A-C Sales Office today. Or write for Bulletin 6381.

A-2762

ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace. Pump can be dismantled or assembled in a half hour without disturbing piping.

Allisite is an Allis-Chalmers trademark.

ALLIS-CHALMERS

It certainly takes POWER to Grind Ore and it's best done in a MARCY Mill

It takes a certain amount of power to grind a ton of a certain ore to a certain size, regardless of mill design. The more power utilized by a mill, the greater the capacity or the finer the grinding. Size for size, MARCY Mills will grind more ore than other types because they utilize the maximum of power and utilize it efficiently. Their low pulp line permits greater impact of the grinding media, quicker removal of finished material with a minimum of overgrinding, and a higher pulp density for better contact between grinding media and ore. This means less floor space, power, and operating labor for a plant equipped with MARCY Mills. That is why MARCY Mills are found in so many grinding plants throughout the world, particularly in large installations.

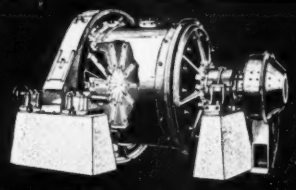
MARCY Open-End Rod Mills, pioneers in fine crushing or coarse grinding—Application of MARCY Open-End Rod Mills to take a coarse feed and, in one pass through the mill, prepare a fine product for the regrind mills is not new. They were doing this in 1919. To the right are a few of the early installations on this work.

As time went on, selective flotation replaced gravity concentration and changed flowsheets for the time being, but MARCY Open-End Rod Mills pioneered in single pass grinding, just as MARCY Ball Mills pioneered in major grinding developments since 1914.

A Few Early Installations	Date
3 Phelps Dodge plants	1919-1920
Cia. Minera Beneficiadora de Inde	1921
The Fresnillo Company	1920
Southwestern Graphite Company	1923
Cerro de Pasco	1925
Hollinger Cons. Gold Mines	1923
Neg. Minera de La Mazata	1923
S. F. Mines of Mexico, Ltd.	1925
Bertha Mineral Company	1926
Cia. Minera de Penoles	1926

MARCY BALL MILLS Since 1914 have been world-wide choice for many plants. One of the companies listed (right) recently placed with us the largest single order for grinding equipment ever bought for any plant from any manufacturer! Repeat orders tell the worth of equipment, and many of the companies listed to the right, as well as others not shown, have placed successive orders for MARCY Ball Mills.

- Phelps Dodge Corporation
- Chile Exploration Co.
- American Smelting & Refining Co.
- U. S. Smelting, Refining & Mining Co.
- Kennecott Copper Corporation
- Climax Molybdenum Co.
- American Metals Co.
- Newmont Mining Co.



OTHER PRODUCTS

Mossco Fahrenwald Flotation Machines; Genuine Wilfley Tables; Mossco-McCarthy Hot Millers; Rock Bit Grinders; Density Controllers; Belt Feeders; Rubber Pinch Valves; Assay and Laboratory Supplies and Equipment; Complete Milling Plants.

Main Office: DENVER, COLO., U.S.A.
El Paso; Salt Lake City; 1775 Broadway, New York, N.Y.

Representatives: Canadian Vickers, Ltd., Montreal; W. L. Judson, Santiago and Lima; The Edward J. Nell Co., Manila, P. I.; The Ore & Chemical Co., 80 Broad St., New York 4, N.Y., for Continental Europe.

For over a third of a century, MARCY Mills have been designed and built from experience and specialization in grinding. Qualified, experienced engineers and extensive field and test data assist in the selection of the proper size and type MARCY Mill for your grinding requirements. MARCY Mills assure you of appreciable savings due to . . .

These Features	with	These Results
Low Pulp Line		Increased Tonnage, Lower Per-Ton Costs
Larger Discharge Opening		Quicker Removal of Finished Product
Rapid Circulation of Mill Contents		Minimum of Overgrinding
Minimum Cushioning of Grinding Medium		Higher Pulp Density, Greater Efficiency
Greater Impact Drop		Improved Metallurgy in Many Flowsheets

Our world-wide metallurgical experience is at your service without cost or obligation. Ask for complete information.

The Mine & Smelter SUPPLY COMPANY

ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT
This is the Coppus VENTAIR. A centrifugal blower. It is designed for long pipe lines, high pressures.
This is the Coppus VANO. The propeller-type, best for shorter pipe lines, medium pressures.

These are the cost-reducing Blowers that give up to 100% more air

Only Coppus makes both types — and both are made especially for *mine* ventilation. One or the other, operating under the conditions for which it is designed, delivers from 30% to 100% more air for a given power consumption than an ordinary all-purpose fan.

They can be used as blowers or exhausters and are driven either by compressed air or electric motor, with capacities up to 90,000 CFM. Like all Coppus products, these blowers wear the "Blue Ribbon" that stands for high achievement in engineering, workmanship and performance.

Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corp., Worcester 2, Mass.

COPPUS ENGINEERING CORPORATION
290 Park Avenue, Worcester 2, Mass.

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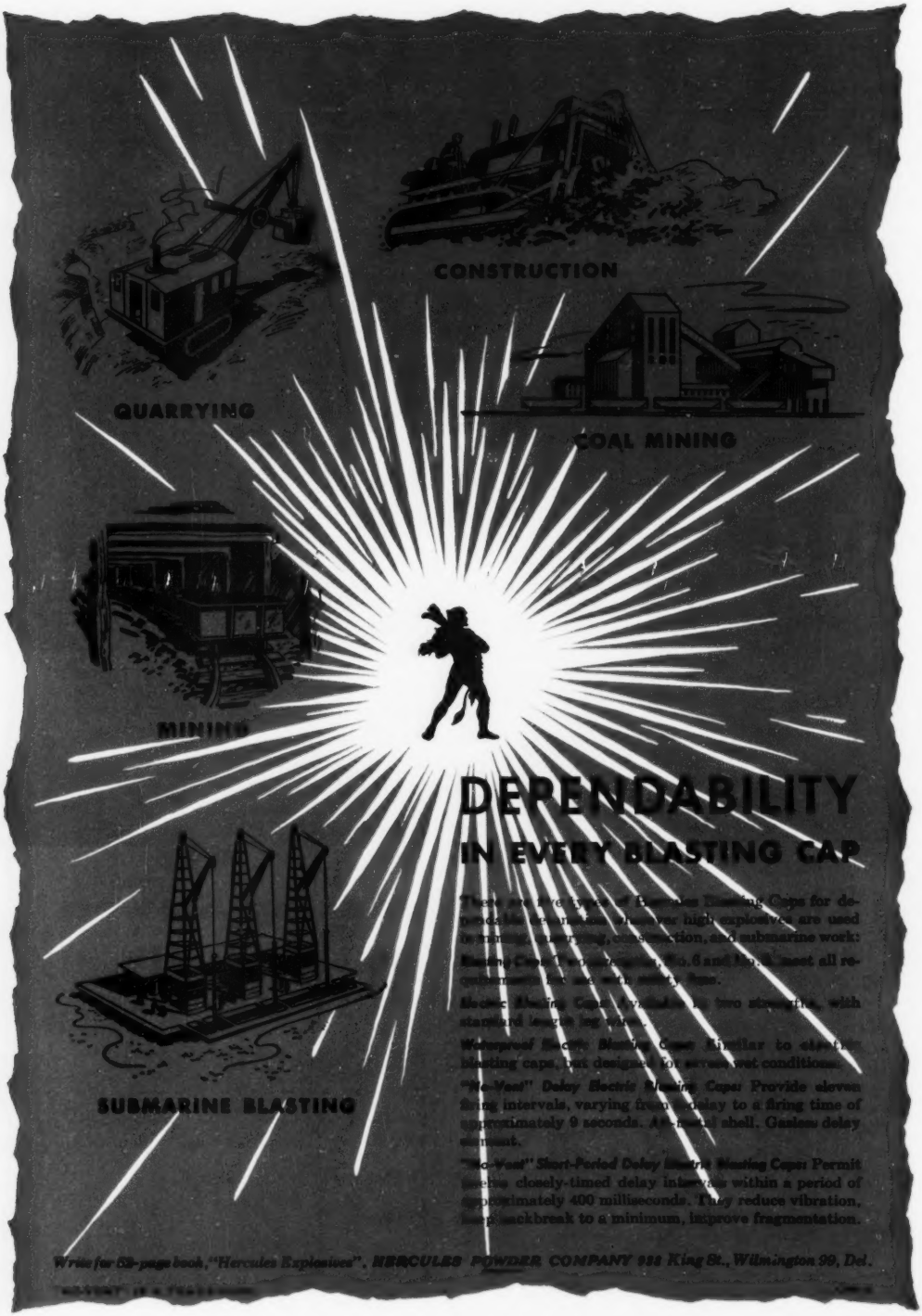

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IN EVERY BLASTING CAP

...kind and size of Hercules Blasting Caps for de-...dable ... whether high explosives are used ... mining, quarrying, construction, and submarine work:

Blasting Caps ... No. 6 and No. 8 meet all re-...ments ... with ... fuse.

Seismic Blasting Caps ... two strengths, with standard length leg wires.

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"Pre-Weet" Delay Electric Blasting Caps: Provide eleven firing intervals, varying from no delay to a firing time of approximately 9 seconds. All-metal shell. Gasless delay element.

"Pre-Weet" Short-Period Delay Electric Blasting Caps: Permit twelve closely-timed delay intervals within a period of approximately 400 milliseconds. They reduce vibration, keep backbreak to a minimum, improve fragmentation.

Write for 52-page book, "Hercules Explosives". HERCULES POWDER COMPANY *934 King St., Wilmington 99, Del.*

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You're in Control...

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The central control station of a Traylor Rotary Kiln is a feature as important as the exactness of its design and assembly—rigid, all-welded steel shell—cut steel driving gear—floating-type riding rings—improved supports and individual planning and construction.

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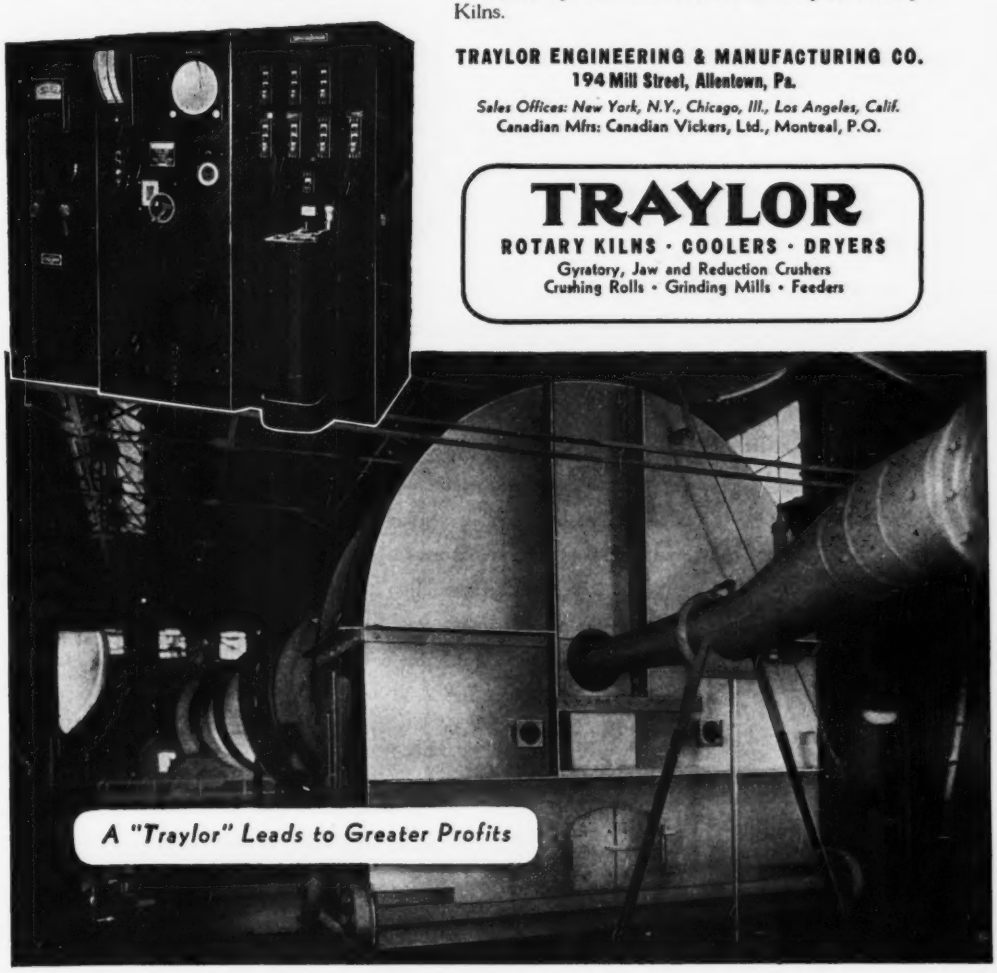

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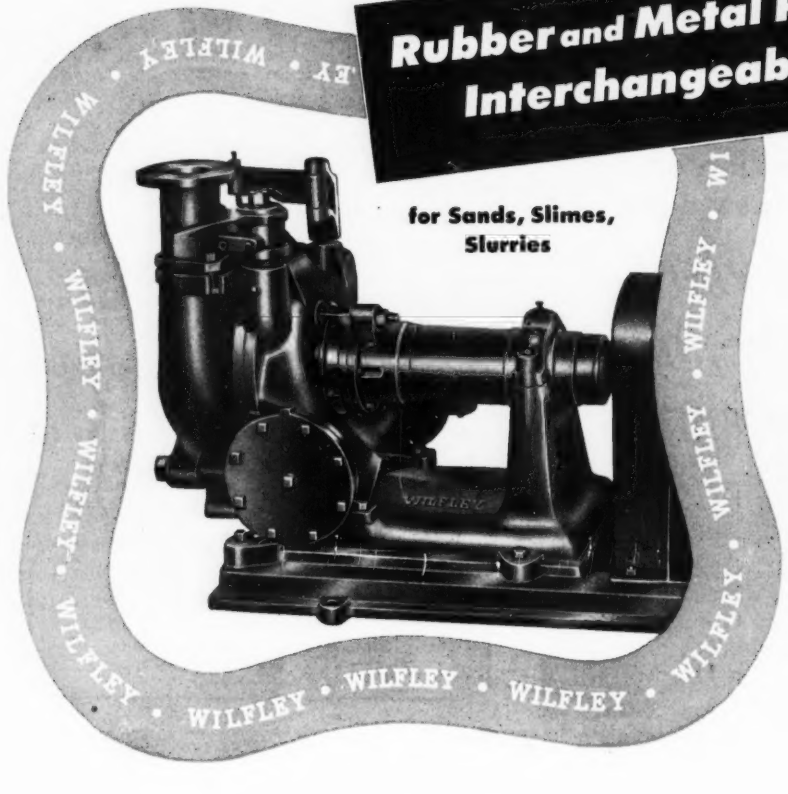
for Sands, Slimes, Slurries



A Companion to the Famous WILFLEY Acid Pump

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Buy WILFLEY for Cost-Saving Performance

Complete interchangeability of parts— rubber to metal, or metal to rubber—is one of many outstanding improvements that make the WILFLEY Sand Pump a big factor in cost-saving production. Stepped-up production, greater efficiency and worthwhile power savings ALL result from WILFLEY'S proven dependability and exclusive construction features. In addition to rubber, wear parts are available in electric furnace iron and other materials individually engineered for every application. An economical size for every purpose. Write or wire for complete details.

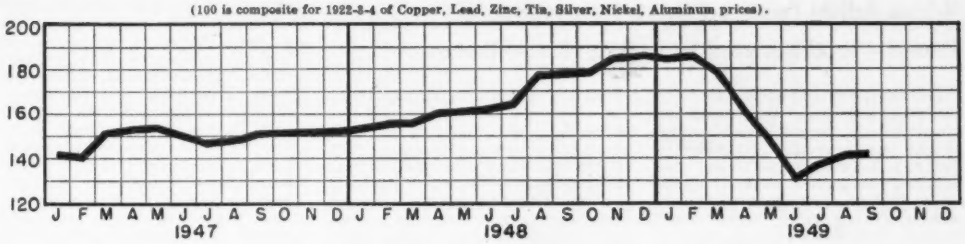
WILFLEY
centrifugal PUMPS

A. R. WILFLEY & SONS, INC.
DENVER, COLORADO, U.S.A.
New York Office: 1775 Broadway, New York City

E & M J OUTLOOK

E&MJ Weighted Index of Non-Ferrous Metal Prices

(100 is composite for 1922-3-4 of Copper, Lead, Zinc, Tin, Silver, Nickel, Aluminum prices).



●

MARKETS

September index for non-ferrous metal prices inched up to 142.24 from 141.90 in August. A tottering 15⅛¢ lead fell to 14¾¢ under pressure from dollar-seeking foreign imports.

A hike in premium on Special High Grade zinc to 1.25¢ is forthcoming. Increased freight rates are responsible.

Resumption of private trading in tin at London metal exchange will not be followed by other metals in the foreseeable future. It boils down to the fact that tin is supplied from sterling areas. Copper, lead and zinc prices are dollar controlled. Private trading could form channel for evasion of exchange controls.

●

LABOR

A long steel strike now would wreak havoc. Businessmen can't believe Washington will permit such a body blow to industry. Especially since Big Steel's more-than-halfway compromise offer puts CIO's further demands strictly in the face-saving class. Hopeful sign: Important galvanizers have come back in the zinc market despite unsettled conditions.

Mine-Mill can make it a cold winter for the non-ferrous industries. Membership is down to a hard core of disciplined party-liners.

●

ABROAD

Devaluation of soft currency is the big news. Here's what it means to mining.

Within the sterling area, gold miners will get a higher price for gold; that is if costs can be kept down. However, an ounce of gold will still buy only $35 worth of American machinery.

It has brought an overdue revision of the tin price (down 8¢ to 95¢ per lb.). Further drop is probable if a truly free market is established.

U. S. metal fabricators will get stiffer competition when exporting to devalued markets. If and when this curtailment pinches, metal miners may be hurt. Until then, with domestic supply about equal to domestic demand in major metals, devaluation will have small effect on U. S. mines.

●

AT HOME

Sunshine's pitchblende find marks the Coeur d'Alene as a possible source of primary uranium mineral. But AEC warns eager speculators that nothing yet found there materially aids the atomic energy program . . . **Don't be surprised** if the next Kennecott president is a non-mining man not now in the Kennecott organization. All that's certain is that the company will try to match Arthur Storke's capability in industrial relations . . . **Despite last-minute amendments,** chances of Senator O'Mahoney's subsidy bill (S. 2105) getting through Congress this session get slimmer by the clock . . . **President Truman wants** $275,000,000 of long term contracting authority put back into the Munitions Board's appropriations.

MARKETS—Trends and Prices

British Adjust Prices on Sharp Devaluation of Pound—Lead Reduced to 14¾c., N. Y.—Tin Lower

DEVALUATION OF THE POUND and other "soft" currencies was the outstanding event of the month. Sir Stafford Cripps, in announcing the revision on Sept. 18, declared that the Labor government's decision was taken only because Britain's dollar problem was insoluble by any other means. Great Britain intends to increase her exports to the dollar area and reduce imports to a minimum. Whether this move to increase exports will cut deeply into our foreign trade in metals and metal products depends solely on the measures that the British intend to take to control the inflationary pressures generated by the cut in the dollar value of the pound from $4.03 to $2.80, a reduction of 30.5%. A straw in the wind was the swift decision by the Labor government to raise the tax on dividends to 30%. The former rate was 25%. The authorities, London advices state, are prepared to limit dividends by law. This move on dividends, it was felt, was prompted by the threat of fresh demands for higher wages. Sir Stafford made it clear that personal incomes, whether from wages, salaries, profits or any other source must be kept down if Great Britain is to avoid large-scale unemployment.

Gold in London was adjusted upward to 248s. an ounce troy, absorbing the difference between the old and the new exchange rate. The price simply moved up to the $35 equivalent. Similar adjustments were made in other sterling areas. Silver also was raised in price by the British.

The Ministry of Supply quickly withdrew all quotations in the British market for major non-ferrous metals. New prices were posted three days after devaluation became effective. Copper for sale in the British market was raised from £107 10s. per long ton, delivered to the consumers' plants, to £140, the new price being equivalent to roughly 17½c. per pound. Lead was raised from £87 5s. to £122, equivalent to 15¼c., but lowered later to £119, owing to the decline in New York on Sept. 26. Good ordinary brands of zinc moved up from £63 10s. to £87 10s., equivalent to 10.94c. These metals, world commodities tied to the dollar, were raised in price to the extent that the pound was devalued.

Dollar-Tin Lowered

Tin prices were fixed by the Ministry of Supply on Sept. 26. Though the prices were marked up sharply in terms of sterling, the net result was a decline in the dollar value of the metal on forward business of 8c. per pound. For tin in the United Kingdom the authorities posted a quotation of £750 per long ton on the 99% grade; £757 on the 99.75% grade; £760 on the 99.9% grade. Of interest to the trade was the statement by the Ministry that discussions between the government and officials of the London Metal Exchange are in progress with a view toward the resumption of trading in tin at the earliest practical date.

RFC withdrew its price of tin on Sept. 26, pending developments abroad. There was no quotation in the domestic market for spot metal on Sept. 26 and 27. RFC named a price of 96c. a pound on Grade A or Straits quality tin on Sept. 28, which was 7c. below the $1.03 quotation that was in effect in New York ever since June 1, 1948. Eventually, the domestic market for spot and prompt metal is expected to match the price set by the British. Domestic consumers were able to purchase Straits quality tin for October arrival at 95c., which was the price set by the Ministry of Supply on f.o.b. New York transactions involving forward business. There was no rush to buy tin at the lower level because consumers felt that a return to a more or less free market in the metal may develop further weakness in prices. Supply of tin is regarded as ample. Curtailment in production and stockpile purchases could change the outlook, market experts admit. World production of tin contained in concentrates declined from 15,800 long tons in June to 12,900 tons in July, the International Tin Study Group reports.

Copper Use Increasing

Demand for copper in the domestic market was quite active throughout September. Talk of a higher price and apprehension over possible strikes inspired some of the buying. However, the statistics of the industry point to a real recovery in use of the metal. The copper industry was encouraged by the showing made by the fabricating division. During August, the copper content of shipments to consumers was 89,175 tons, which contrasts sharply with the 61,220 tons delivered in the preceding month. Apparent consumption of copper during the eight months ended with August averaged 80,153 tons a month, against 116,424 tons in the same period of 1948.

Domestic production of crude copper in August totaled 62,569 tons, which compares with 62,449 tons in July and the monthly peak for the current year of 97,123 tons established in March. In spite of the strike at the Carteret refinery of the American Metal Co., production of refined copper in August reached 85,577 tons. The strike caused a tight situation in billets and cakes to worsen. Imports helped during the emergency. Deliveries of refined copper to fabricating plants in August amounted to 90,739 tons, against 45,316 tons in July. Quotations ruled firm on the basis of 17⅝c., Connecticut Valley. An easier situation in scrap developed late in the month.

Lead Price Dips

With most of the buying of lead for the stockpile concluded so far as the current year is concerned, and consumer demands taking on a more normal pattern, the market quieted down appreciably in the second half of the month. Foreign offerings increased and lower prices were named on imported metal. Scrap was released in good volume, resulting in an intake problem that added pressure on the

Average Prices for September (E&MJ Quotations)

Copper:	
Electrolytic, Domestic Refinery	17.325
Electrolytic, Export, Refinery	17.550
Lead:	
Common, New York	15.050
Common, St. Louis	14.854
Silver and Sterling Exchange:	
Silver, New York, per oz.	73.214
Silver, London, pence per oz.	52.298
Sterling Exchange, "Checks"	343.929
Zinc:	
Prime Western, East St. Louis	10.005
Tin:	
New York, Straits	102.087
New York, 99% min.	(e)101.087
Gold, per oz. U.S. price	$35.000
Quicksilver, per flask	$72.800
Antimony, (E.&M.J.) (d)	41.780
Antimony, bulk, Laredo	38.500
Antimony, in cases, Laredo	39.000
Platinum, Refined, per oz.	$69.000
Cadmium, (a)	200.000
Cadmium (b)	207.500
Cadmium (c)	215.000
Aluminum, 99% plus, ingot	17.000
Magnesium, ingot	20.500
Nickel (f)	40.000

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange, checks, in cents. Quicksilver, per flask of 76 lb.

(a) Cadmium average based on the producers' quotation.

(b) Cadmium average based on the average of the producers' and platers' quotation.

(c) Cadmium average based on platers' quotation.

(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.

(e) Tin contained.

(f) F. o. b. Port Colborne, U. S. duty included.

price structure. An important custom smelter lowered its New York quotation three-eighths of a cent, effective Sept. 26. Other producers soon followed, establishing the market at 14¾c. Foreign lead had been offered at less than 14c., duty paid, ex dock New York. The decline brought in no new business worth mentioning.

On Sept. 1 a Midwestern producer reported the sale of a fair quantity of Prime Western zinc at 10½c., East St. Louis. With sellers far apart in their views on the outlook for zinc, the one-half cent advance met with widespread opposition. In a few days the move was abandoned. Consumers learned that substantial tonnages were available at the old 10c. level. In the export market there were sellers of Prime Western at 9½c., f.a.s. Gulf ports. The foreign market was unsettled, which proved to be a factor in favoring the 10c. level here for the present. As the month ended a strike shut off production at New Jersey Zinc. This stimulated buying of Special High Grade Zinc by die casters. A differential of 1¼c. eventually will be re-established on Special High, trade authorities believe, owing to recent advances in freight rates.

Quicksilver was lower. Consumption declined from 10,400 flasks in the first quarter to 7,600 flasks in the second quarter. Imports established a new high for a three-months' period, totaling 29,492 flasks for April-May. The bulk of this large supply was imported from Italy by ECA for the stockpile.

(Continued on page 100)

Major Metals

U. S. DAILY AND AVERAGE PRICES

Sept. 1949	Electrolytic (a) Domestic	Copper (b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
1	17.325	17.550	103.000	15.125	14.925	10.075
2	17.325	17.550	103.000	15.125	14.925	10.025
3	No Market	17.550	103.000	15.125	14.925	10.000
5	Holiday	17.550	Holiday	Holiday	Holiday	Holiday
6	17.325	17.550	103.000	15.125	14.925	10.015
7	17.325	17.550	103.000	15.125	14.925	10.000
8	17.325	17.550	103.000	15.125	14.925	10.000
9	17.325	17.550	103.000	15.125	14.925	10.000
10	No Market	17.550	103.000	15.125	14.925	10.000
12	17.325	17.550	103.000	15.125	14.925	10.000
13	17.325	17.550	103.000	15.125	14.925	10.000
14	17.325	17.550	103.000	15.125	14.925	10.000
15	17.325	17.550	103.000	15.125	14.925	10.000
16	17.325	17.550	103.000	15.125	14.925	10.000
17	No Market	17.550	103.000	15.125	14.925	10.000
19	17.325	17.550	103.000	15.125	14.925	10.000
20	17.325	17.550	103.000	15.125	14.925	10.000
21	17.325	17.550	103.000	15.125	14.925	10.000
22	17.325	17.550	103.000	15.125	14.925	10.000
23	17.325	17.550	103.000	15.125	14.925	10.000
24	No Market	17.550	103.000	15.125	14.925	10.000
26	17.325	17.550	No Market	14.750	14.600	10.000
27	17.325	17.550	No Market	14.750	14.600	10.000
28	17.325	17.550	96.000	14.750	14.550	10.000
29	17.325	17.550	96.000	14.750	14.550	10.000
30	17.325	17.550	96.000	14.750	14.550	10.000
AVERAGES FOR MONTH						
Sept.	17.325	17.550	102.087	15.050	14.854	10.005
AVERAGES FOR WEEK						
Sept.						
7	17.325	17.550	103.000	15.125	14.925	10.023
14	17.325	17.550	103.000	15.125	14.925	10.000
21	17.325	17.550	103.000	15.125	14.925	10.000
28	17.325	17.550	101.250	14.938	14.754	10.000
CALENDAR WEEK AVERAGES						
Sept.						
3	17.325	17.550	103.000	15.125	14.925	10.017
10	17.325	17.550	103.000	15.125	14.925	10.003
17	17.325	17.550	103.000	15.125	14.925	10.000
24	17.325	17.550	103.000	15.125	14.925	10.000

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

Sept. 1949	Sterling Exchange "Checks"	Silver (c) New York	Silver (c) London	Gold London	Gold (d) United States
1	402.500	73.000	44.500d.	172s. 3d.	$35.00
2	402.500	73.000	44.500d.	172s. 3d.	35.00
3	(e)	(e)	(e)	(e)	35.00
5	Holiday	Holiday	44.500d.	172s. 3d.	Holiday
6	402.500	73.000	44.500d.	172s. 3d.	35.00
7	402.500	73.250	44.500d.	172s. 3d.	35.00
8	402.500	73.250	44.500d.	172s. 3d.	35.00
9	402.500	73.250	44.500d.	172s. 3d.	35.00
10	(e)	(e)	(e)	(e)	35.00
12	402.500	73.250	44.500d.	172s. 3d.	35.00
13	402.500	73.250	44.500d.	172s. 3d.	35.00
14	402.500	73.250	44.500d.	172s. 3d.	35.00
15	402.500	73.250	44.500d.	172s. 3d.	35.00
16	402.500	73.250	44.500d.	172s. 3d.	35.00
17	(e)	(e)	(e)	(e)	35.00
19	279.500	73.250	Closed	Closed	35.00
20	279.500	73.250	64.000d.	248s.	35.00
21	279.500	73.250	64.000d.	248s.	35.00
22	279.500	73.250	62.750d.	248s.	35.00
23	279.500	73.250	62.250d.	248s.	35.00
24	(e)	(e)	(e)	(e)	35.00
26	279.500	73.250	62.000d.	248s.	35.00
27	279.500	73.250	62.000d.	248s.	35.00
28	279.500	73.250	62.250d.	248s.	35.00
29	279.500	73.250	62.500d.	248s.	35.00
30	279.500	73.250	62.500d.	248s.	35.00
AVERAGES FOR MONTH					
Sept.	343.929	73.214	52.298d.	—	35.00
AVERAGES FOR WEEK					
Sept.					
7	402.500	73.063	—	—	
14	402.500	73.250	—	—	
21	328.700	73.250	—	—	
28	279.500	73.250	—	—	

Calendar week averages, New York Silver: Sept. 3rd, 73.000; 10th, 73.188; 17th, 73.250; 24th, 73.250.

(e) No market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.675c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade and Special High Grade zinc delivered in the East and Middle West command a premium of 1c. per pound over the current market for the Prime Western.

Quotations for lead are for common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and one-eighth cent fractions per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance for carrying, dilivering, and marketing. In addition to foreign silver, the quotations also apply to domestic and Treasury silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Behind the By Lines...

G. P. Lutjen

» **While scratching** your head over ways to save a few nickels on production costs, don't overlook your hoisting rope. Recently developed rope testing devices (page 72) tell you not only when and where rope failure is starting, but can give you a good idea on what is causing failure. With such information, corrective measures can be taken to lengthen the life of the cable.

Hoisting rope, particularly in the deeper mines, represents a substantial investment. It is the underground mine's lifeline, and most important, men's lives depend on it. Your rope certainly needs more attention than an occasional apprehensive glance.

» **While on** the subject of rope we may as well give ourselves enough for the proverbial hanging and mention one of its rarer uses; probably the only known case where rope solved a fault problem. The instance occurred while developing the Sixteen-to-One mine in California. We quote from a 1931 issue of E&MJ.

"When the Tightener winze struck the fault plane in the vicinity of the 1900 level, and the vein disappeared the winze was continued. The superintendent asked Maxfield (president) how far sinking was to be continued before crosscutting. Maxfield said: "How long is the rope?" The superintendent replied, "2100 ft." Maxfield then said: "Sink to the end of the rope." The crosscut was started at the 2100-ft. point, and at 200 ft. (in the footwall of the winze) it struck the upper tip of the segment of the vein."

Which is perfectly all right, but don't throw away those magnetometers and Geiger counters.

» **If you are in a position,** and who in the mining industry isn't, where you may some day have to give more than just academic thought to designing a crushing plant, you'll probably tear out and file pages 94, 95 and 96 of this issue. **L. M. Anderson** of Allis-Chalmers' Basic Industry Division, gives you enough layouts to provide for crushing anything from a bride's first biscuits to the most stubborn ore.

» **"A Decade of Electrolytic Manganese"** (page 80) tells you what this industry has been doing during the last ten years besides producing 22,194,205 lb. of metal. **Russell H. Bennett** describes what is going on in the hills of Tennessee and offers some conjectures on the future of the ever-strategic manganese.

» **Every so often** an editor finds that the grindstone to which he keeps his nose pressed is temporarily plush-lined. In pursuit of a story he gets to a place that only the more sybaritic and better-heeled among his fellow citizens ever manage to see. Take **Lloyd Hughlett,** editor of *Ingenieria Internacional,* McGraw-Hill's Spanish language magazine, for example.

He covered an engineering convention in Rio de Janeiro. In following up this arduous assignment, he found himself staying at the Quitandinha Hotel, 12 stories of sheer elegance in the hills back of Rio. Take one part luxurious entertainment, one part fabulous surroundings and stir well with unlimited extravagance of hospitality. That's the Quitandinha. And Lloyd got paid for staying there.

To rest up, he says, he took a flying trip up the valley of the Rio Doce to see how the Itabira iron ore development is getting on. You'll find his report on this richest of iron orebodies on page 76. Nary a word on the Quitandinha, though.

» **Eye-catching items** in various departments are... an Operating Idea to improve your haulage system (P. 102);...what happened at the Mine-Mill convention at Chicago (P. 106);...results of a survey on long-hole drilling with tungsten-carbide bits vs. blasthole diamond drilling, in Keeping Tab on Practice (P. 97);...a new handy carbon monoxide detector (P. 115);...interesting comment on the Idaho labor situation plus the complete Coeur d'Alene wage scale (P. 123).

» **Report from our** Bolivian correspondent this month is faintly reminiscent of those days a few years ago when the press was liberally sprinkled with I-Saw-It-Happen items from beleaguered war correspondents. Our letter from La Paz reads:

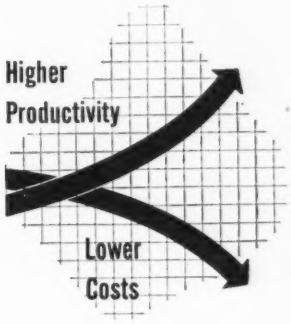
" . . . I just got in here when the civil war in which we are engaged, started. A week ago, very well armed groups of civilians and some army officers, together with the miners of some districts, all belonging to the totalitarian party, in its different shades of fascism and communism, that was deposed in the bloody revolution staged in La Paz in 1946 and which ended with the hanging of President Villaroel, struck by surprise and seized all important cities of the country, with the exception of La Paz and Oruro; they also managed to get hold of most of the army planes as well as the transports of commercial companies. Fortunately, the democratic spirit made possible to raise rapidly some armies in La Paz, and to make a permanent resistance within some of the captured cities, with the result that the loyal forces have already recaptured all the cities on the high plateau and the valley. . . ."

» **In other** combat bulletins, we heard from a number of hitherto unsuspected grammarians who denounced us for using the term, "most unique." They hold that there is no degree of uniqueness, and we'll bet that they're right.

As far as the "most unique" article on cooking is concerned, (E&MJ, August, 1949), one lady has written us that, "...It quite intrigued my good husband. As a matter of fact he read it over twice." With this kind of encouragement, we may run a sequel, "Mixing Martinis at 15,000 Feet."

ENGINEERING AND MINING JOURNAL

OCTOBER, 1949



The Problem of the Cost of Mining

THE SYMBOL reproduced above will appear over the next few months in each of the 34 McGraw-Hill magazines, which among them cover practically the entire business and industrial life of America. Its crossed arrows will serve as a signpost to editorial material bearing directly on industry's No. 1 problem today; how to increase productivity and lower operating costs.

For the mining industry, the problem, of course, is acute. Profit margins for many companies have narrowed painfully, and in some instances have vanished altogether. The industry needs cost or tax reduction, to stay healthy, vastly more than it needs a Governmental shot in the arm.

Yet considering the inexorable upward climb of operating costs over the years, is it vain to believe that mining costs can and will be brought down in the near future? Let us consider this question from three points of view.

First, it is a matter of record that mining costs have been brought down at several periods in the past that greatly resembled the present. The long-term trend of costs is, indeed, upward, but the sharp rise of recent years should now be balanced by a dip. We hope soon to be able to publish data to show the factual basis for this statement.

Second, paradoxical as it may seem, there exists among a great many members of industrial management, and mining is no exception, a real reluctance to engage in cost-cutting drives. This hesitation, whether or not it is recognized, is based on one or more of the following factors:

1. Fear that a cost-cutting campaign may prove unsuccessful and therefore discrediting.

2. Reluctance to apply at once all the cost-cutting measures management can think of because "then what would I have left to try when things get really tough?"

3. Unwillingness to try new and unfamiliar techniques or equipment.

4. Unwillingness to cause hardship or dislocation among the working force.

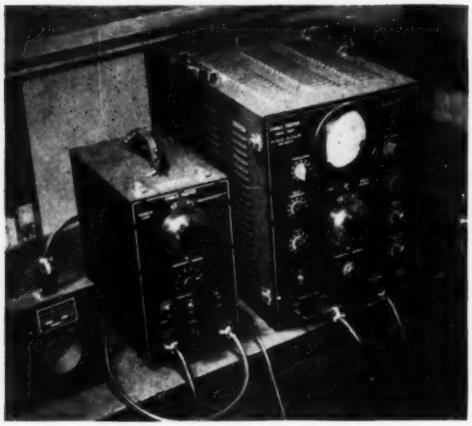
These statements are not made idly. They are based on close observation of a great many mining and other industrial organizations. We hope that no management will dismiss them until it can honestly say that none of the foregoing factors is blocking cost reduction in its own operations.

Third, what are the elements of a significant cost reduction program? Proper analysis of costs ought to come first, followed by attack on any vulnerable cost items revealed by this analysis.

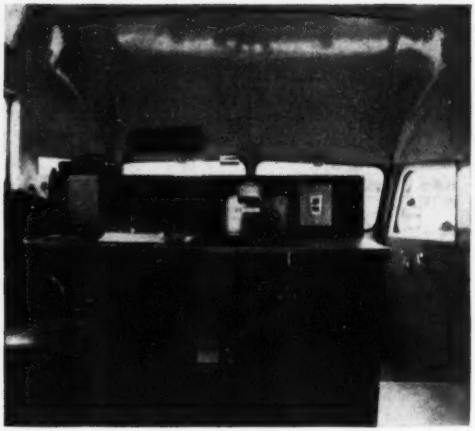
For example, one such analysis, made recently, showed a certain mining company that substantial, and hitherto overlooked, savings could be made in its method of timber handling. Another analysis showed a second mining company that its "indirect" mining costs had increased since 1939 in much greater proportion than the "direct" costs. Investigation indicates that unregulated purchases of supplies and poor use of power are at the bottom of this increase.

In short, we believe firmly that there are things mining management can do, and will do, to bring operating costs down, or at least to prevent further increases. Labor has just as big a part, and just as big a stake, in this effort as has management. In the next issue, under the above symbol, we will present specific examples of how this job of controlling costs is being done.

DUMONT CABLE TESTER



DUMONT CABLE TESTER consists of a main unit (right) connected by cable to remote unit (center) set up close to rope being tested. Test coil at left encircles hoist rope.



RECORDING EQUIPMENT of DuMont tester installed in truck of Nova Scotia Department of Mines. Charts at right show data obtained at rope tests conducted recently at coal mines.

Cable Testers Reveal Causes Of Rope Wear and Failure

THE CONDITION OF HOISTING ROPES is a matter of constant concern for mine operators, and few if any are complacent about the possibility of a cage disaster due to rope failure. However, despite systematic rope care and inspection programs, these operators have been baffled by the inability to detect certain types of internal corrosion and deterioration which have been the cause of a number of serious accidents. It is, therefore, quite encouraging to note that mine research groups, rope companies, engineering companies in various parts of the world, notably Canada, England, and South Africa, have developed equipment to aid in the detection of rope deterioration and to disclose causes of rope wear. Four types are described in the following pages, three of which make non-destructive tests while the ropes are in actual operation.

I. The DuMont Cable Tester

Immediately after a serious cage disaster in Ontario which took the lives of 16 men in 1945, the General Engineering Co. of Toronto, Canada, began a series of tests to determine whether the Cyclograph, made by Allen B. DuMont Laboratories, Inc., Passaic, N. J., could be used to make non-destructive tests on hoisting ropes. Briefly stated, the Cyclograph makes use of the fact that the energy absorbed by a body in a field of a coil carrying an alternating current depends upon the material in the body and also upon internal structure and stresses in that material. Thus the Cyclograph became part of a Rope Tester (see illustration), which provided a means to measure and record changes in the electro-magnetic properties of a hoist rope under test. Early and subsequent tests with this equipment have been carried on in cooperation with the Ontario Research Foundation. Results have been very encouraging.

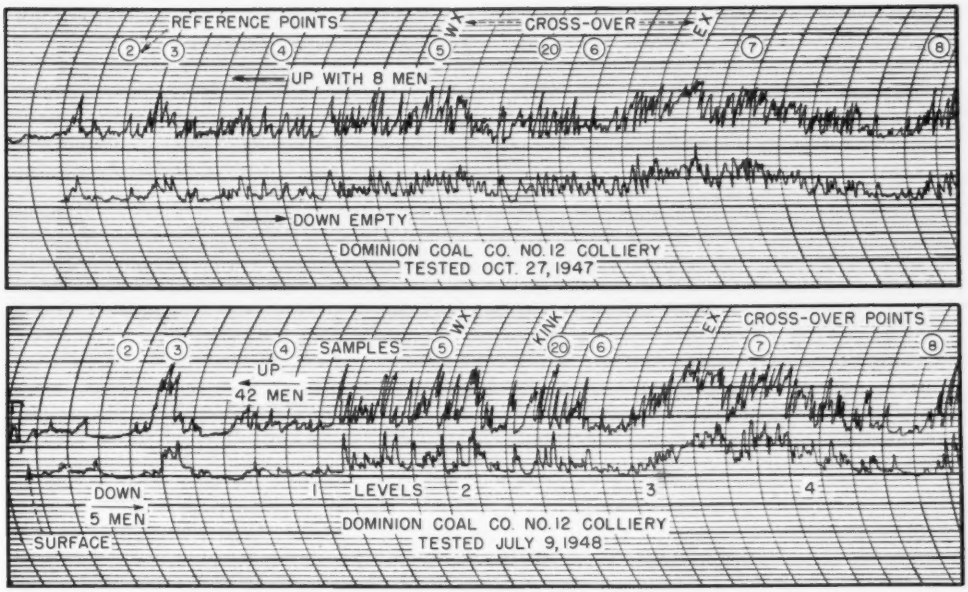
In practice, a more recent model of the rope tester is operated at test frequency which gives a continuously increasing reading with increasing stress in the rope being tested. Recordings are taken from time to time over the length of the rope at two known loads. The recordings will not by any means be a straight line, but so long as no increase in unit stress has occurred, the recorder will produce the same pattern for the same rope at the same load. Any increase in reading at one point in the rope can only be due to increased stress and produces a bump on the pattern which continues to develop as long as the stress increases.

The difference in height of such a bump at two known loads indicates whether the increase in stress causing it is due to a reduction in the load-carrying cross-section of the rope or to an increase in internal stresses due to plastic deformation or damage. Thus information revealed by the tester if properly interpreted can be used to reveal kinks, corrosion, deformation at cross-over points, and rope stresses due to acceleration, deceleration, faulty hoist operation and defective shaft installations. In other words, the mine operator can now virtually feel the pulse of his hoisting rope and determine in advance what conditions are contributing to early rope deterioration, and detect damage or deformation of the hoisting rope.

The equipment and hoisting technique as now developed makes it possible to secure accurate, reliable and duplicatable records of a given rope in practically any normal installation without dismantling any of the hoisting gear and usually without interrupting normal operations.

In field work carried on recently in Nova Scotia by W. Simpson, Inspector, Nova Scotia Department of

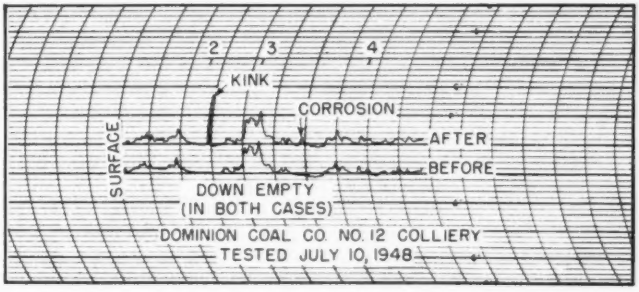
WHAT THE CABLE TESTER REVEALS



CHARTS RECORDED by DuMont unit for same rope at two different tests reveal significant pattern of "bumps" showing stresses in rope while in use. Properly interpreted, these bumps can indicate progressive wear, damage, or deterioration in hoisting ropes.

Mines, the equipment was mounted on a trailer. Equipment included the Rope Tester, an Esterline-Angus recording milliammeter to record rope tester readings, and a similar recording wattmeter to record power input at the hoist. A Selsyn drive is provided so that the paper in the recorders may be driven from the hoist or sheave in contact with the rope. Results of some of the field tests are shown in the accompanying charts.

The foregoing information is based principally upon a report, "Electronic Rope Tester," published by the General Engineering Co. (Canada), Ltd., Toronto, Canada, prepared by P. E. Cavanagh and R. S. Segsworth working in cooperation with the Nova Scotia Department of Mines.



SAME ROPE tested above was kinked and corroded before discard and then tested with DuMont unit. Note bumps showing kink and corrosion in this recorded chart.

II. The Micro-Tensiometer

The micro-tensiometer, developed by British Ropes, Ltd., Doncaster, England, is another useful device for testing stresses in moving hoisting ropes. Chief value of this instrument is its ability to record momentary shock loads on hoisting ropes caused by guide misalignment, faulty guide shoes, acceleration, deceleration and other factors. In one instance an analysis of shock loadings revealed by the tensiometer enabled a company to double the life of ropes by correcting mechanical defects. See page 74.

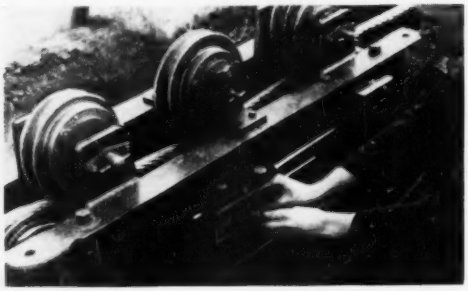
As shown in the illustration on page 74, the instrument consists of a frame, a steel bar supported against 2 fulcrum bars, 5 pulleys (3 calibration and 2 deflection), a recording unit and a differential gear box. The three central pulleys are the calibration pulleys against which the rope must always travel so that its neutral axis is kept in the same place constantly.

To insure constant rope travel through the instrument at the correct angle of deflection, an upward pressure is maintained by two outer deflecting pulleys which are raised to a point where any change in the rope's diameter does not alter the angle of deflection.

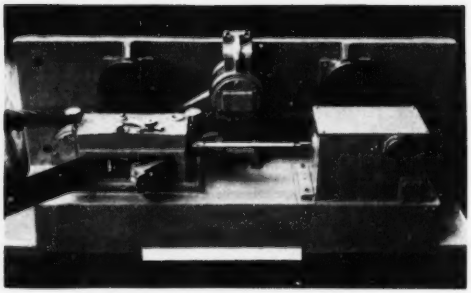
Of the calibration pulleys, two are fixed, but the center pulley is coupled to the center of the steel tension bar and is free to move in an upward direction. This movement is transmitted by a lever to a recording unit situated on the frame. Recordings are made on a celluloid film by a stylus, from which enlarged photographic records are obtained. This film is driven by a shaft from a differential gear box on the frame, the gears being driven by the deflecting pulley and the rope.

The center assembly is free to

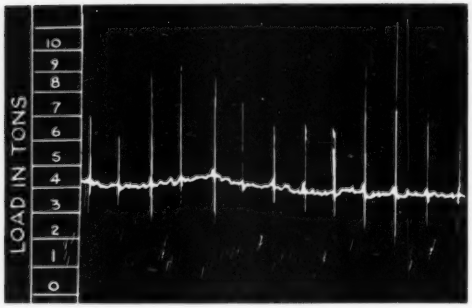
THE MICRO-TENSIOMETER



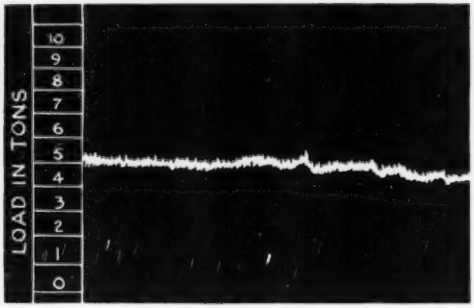
MICRO-TENSIOMETER records momentary shock loads on hoisting ropes caused by guide misalignment, faulty guide shoes, acceleration, deceleration, and other factors. See below.



MORE RECENT MODEL of the micro-tensiometer now being used has an additional mechanism for driving recording film independently of rope travel, and records 1/10-sec. time intervals.



BEFORE. Micro-Tensiometer registers effects of plucking action by surge wheel on hoisting rope in colliery in England.



AFTER. Upon advice of rope experts, factors causing shock were eliminated as shown by this test. Rope life was doubled.

move in an upward direction, and this movement is only 0.0005 in. for each ton tension in the rope. The moving assembly is as light as possible to enable sharp impact shocks to be registered accurately.

A more recent model of the micro-tensiometer now coming into use has an additional mechanism for driving the film independently of the rope travel and registering 1/10-sec. time intervals on the film.

The micro-tensiometer is not sold to rope users, but is used by service engineers of British Ropes, Ltd. By arrangement the company will assist a customer to obtain a device for his own use.

The accompanying charts illustrate the shock loads impressed on a hoisting rope in a British colliery caused by plucking action of a surge wheel.

The Decelerometer

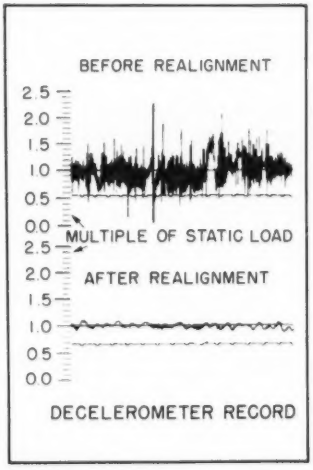
Another report issued by British Ropes, Ltd., on "Shaft Guide Reactions" and prepared by J. L. Kerry and H. Hitchen, AMIE, contains graphs showing the variable forces imposed on hoisting ropes as recorded by the Decelerometer.[1] This device records information similar to that obtained with the micro-tensiometer.

In one instance the short rope life of a shaft installation using wooden guides and steel shoes was found to be due to misalignment of the guides. Decelerometer readings are shown here which reveal how excessive these loads were and how they were eliminated by proper alignment of the guides.

III. Ontario Testing Machine

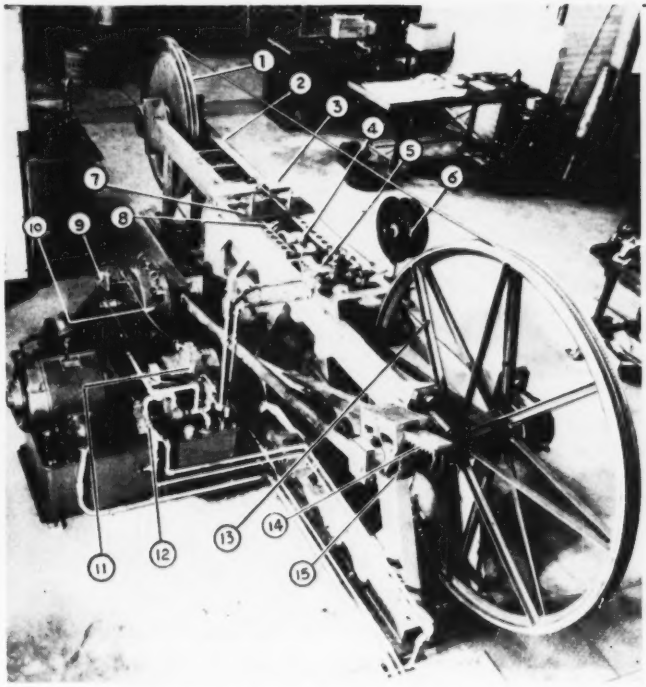
The machine illustrated here was designed to test ropes non-destructively. The unit is intended to duplicate working conditions as nearly as possible, and to test ropes under fluctuating loads—a unique and desirable feature since all hoisting ropes operate under variable loads. The work is being done by the Ontario Research Foundation under sponsorship of the Ontario Research Council (Wire Rope Sub-

[1]See also "Winding Rope Reactions" by H. Hitchen, Transactions of The Institution of Mining Engineers, Vol. CIII, part 5.



TWO DECELEROMETER recordings on mine rope employed in shaft using two wood guides and steel shoes, show why ropes deteriorate excessively if guides are out of alignment, and how mild the shock forces are if guides are aligned properly. Lower line indicates 1/10-sec. intervals to show duration of shock loads.

ONTARIO ROPE TESTER



Parts of Wire Rope Testing Machine

1. Test or driven sheave.
2. Slide frame.
3. Main frame.
4. Dynamometer linkage.
5. Hydraulic cylinder and piston.
6. Oil pressure recorder.
7. Retainer block with removable pins.
8. Adjusting screw.
9. Cam actuated hydraulic valve showing cam mounted on reducer shaft underneath.
10. Drive motor and speed reducer.
11. Hydraulic unit: Motor, pump, reservoir and relief valves.
12. Oil cooler.
13. Drive pulley.
14. Rack connected to speed reducer crank.
15. Pinion, meshing with rack 14.

ONTARIO RESEARCH Foundation employs this machine to test ropes non-destructively, duplicating working conditions as nearly as possible. Effects of fluctuating loads, pulley size, moisture, lubricants, corrosive forces on rope life will be determined.

Committee of the Mines, Minerals, and Metallurgy Sub-Committee).

Problems of detail in design were worked out by the General Engineering Co. of Canada, Ltd., of Toronto. The machine was built by Peerless Engineering Co., Ltd., of Toronto.

Essential parts of the machine include a test, or driven sheave supported on a sliding frame. The drive sheave corresponding to a hoisting drum is supported on the main stationary frame. The drive sheave is driven by a motor and speed reducer through a rack and pinion which operates the sheave through one revolution in each direction every 6 sec. Sheaves are grooved for a $\frac{5}{8}$-in. rope. This is passed over the two sheaves and makes two complete turns around the drive sheave before being fastened.

Tension is applied to the rope by a hydraulic cylinder which moves the sliding frame relative to the stationary frame, and thus tightens the rope. A dynamometer placed between the sliding and stationary frames measures tensions applied to the rope and permits its reasonably fine adjustment for experiments.

Rope tension in each cycle, which consists of one revolution each way, may be controlled by setting relief valves on the hydraulic cylinder. Thus tension on the rope may be kept constant or varied from a chosen value to half that value during each cycle.

The machine has been built to apply tensions varying from zero to 20,000 lb. Therefore, ropes can be operated under constant loads up to 20,000 lb. Maximum limit of the fluctuating loads would be from 10,000 to 20,000 lb. in each cycle. As the machine is designed to test $\frac{5}{8}$-in. ropes which may have a nominal breaking strength of 30,000 lb., it is possible to apply loads up to two-thirds of the ultimate strength of the rope.

It is expected that this unit will reveal the following vital information about hoisting ropes:

1. Rope life under constant loads. In one experiment, a $\frac{5}{8}$-in., 6x19, plow-steel rope lasted 4 to 5 days under a constant tension of 10,000 lb., and at 20,000 lb. constant load the life was one-third as long.

2. Effects of fluctuating loads on rope life.

3. Effects of moisture, acidity and lubricants on hoisting ropes. (An atmosphere box can be attached to vary conditions.)

4. Effects of pulley size, shape and size of rope groove, fleet angle, and various constructions on rope life.

Various instruments, designed to measure stresses within an operating cycle, are being tried out, including the DuMont Cable Tester previously described. The foregoing information on the Ontario rope testing device is presented through the courtesy of O. W. Ellis, Director, Department of Engineering & Metallurgy, Ontario Research Foundation.

Other members active on the Sub-Committee on Wire Ropes include representatives of various wire and steel companies, the Ottawa Department of Mines, the Ontario Mining Association, International Nickel Co., Imperial Oil, Ltd., and the Ontario Department of Mines.

THE PROBLEM in mining Caue Peak, Brazil's mountain of iron ore, is still shipment from this point to coast (opposite.)

Getting at Itabira's Iron

MR. HUGHLETT'S REPORT on Itabira has a familiar ring. In 1946, when an E&MJ staff member visited the mine, the crushers and conveyors were at the property but not yet set up. They are still not yet set up. The railroad in 1946 needed only a little more work to make it possible to ship 1,500,000 tons of high-grade iron ore annually. The railroad still needs more work, and more investment, to gain tonnage.

Certainly this record calls for a thorough examination of the spending practices of the Cia. Vale do Rio Doce, before the Export-Import bank sinks any more money into this enterprise.

Unquestionably exploitation of this important resource has great significance, both for the Brazilian economy and for the world at large. Nevertheless, sound business practice demands full information on past performance and present plans as a basis for evaluating any further credits.

The Editors.

LLOYD J. HUGHLETT

Editor

Ingeniería Internacional

WITH an important part of the world's supplies of iron ore lying within a 50-mile radius of Belo Horizonte, it is no wonder that Brazil's iron resources excite speculation year after year. The ore is there without a doubt, and it is of excellent grade. The only problem has been to get it out and shipped to market.

The farthest-advanced and largest-scale iron mining operations in Brazil are currently those of the Cia. Valle do Rio Doce near Itabira in the state of Minas Geraes. These center around the famous mountain of iron ore called Caue Peak, which is now being sliced steadily away. For a description of Caue Peak, see *E&MJ* for December, 1942, and January, 1943.

The Cia. Vale do Rio Doce, or CVRD, was formed by Government decree June 1, 1942, to take over development of the Itabira iron from the Itabira Iron Ore Co., which had held title to the region since 1911. Purpose of the new company was to speed up ore shipments for English and American blast furnaces as a wartime measure.

The CVRD's capitalization is owned 56/65ths by the Brazilian Government, which holds all the common stock and most of the preferred. Total financing is now close to $75,000,000, of which the Export-Import Bank of the United States has furnished about $25,000,000. The Bank is now being asked to bring its total investment in the Rio Doce valley up to about $30,000,000.

Production, as a result of this investment, has been slow in coming. Shipments rose from 30,000 metric tons in 1942 to 143,000 tons in 1944, when actual mining on Caue Peak got under way. Despite considerable work on the 350-mile railroad connecting the mines with the coast at Vitoria, this link has been consistently the chief hindrance to attaining the company's production

AT VITORIA, 375 miles away, ships of 9,000 tons maximum burden load ore at rate of 1,000 tons per hour by belt loaders.

goal of 1,500,000 tons of iron ore annually.

Lack of shipping to carry ore abroad held up production through 1945 and 1946, but beginning in 1947 this difficulty was relieved. In 1948, output was 417,680 tons. Plans now call for 1,500,000 tons yearly by 1951. This again hinges on completion of mining and transport facilities at the property and on successful streamlining and strengthening of the railroad to Vitoria.

To review briefly Itabira's reserves, the orebodies now being worked contain iron ore of four general types: 1, compact hematite, hard and massive, running 69% iron and 0.025% phosphorus; 2, rubble ore, boulders and pebbles of hematite cemented with limonite, runs 64% iron and 0.06% phosphorus; 3, canga, an enriched lower-grade phase that contains 54 to 62% iron; 4, itabirite, a thinly-bedded material carrying silica and hematite, runs 46 to 52% iron, would make good "wash" ore. Tonnages available are as follows:

Open hearth lump	100,000,000
Blast furnace ore	75,000,000
Rubble ore	75,000,000
Canga	50,000,000
Itabirite	700,000,000

These estimates of the quantities of blast furnace and rubble ores (some of which would require sintering) run higher than previous estimates. This is because it appears that these softer ores make up a greater proportion of total reserves than was expected, particularly at the nearby deposit of Conceicao. Also at Caue, diamond drilling now indicates that at depth the ore becomes increasingly soft.

Mining at the three adjoining orebodies of Caue, Conceicao, and Dois Corregos has been carried on largely by hand methods. These involved breaking out the small production that was shipped abroad and also preparing Caue Peak for large scale production.

Between 40,000 and 50,000 tons per month of hard lump hematite is now being produced, still by hand. This output is sized to minus 8-in. plus ½-in. The undersize is discarded at present because only one grade of ore can be handled in the ore loading docks at Vitoria. During 1949 average grade of ore shipped was 68.68% iron and 0.0395% phosphorus.

Naturally before any real increase in production can be expected, the hand methods must be replaced by modern mechanized mining methods. Most of the necessary equipment has been purchased and the only remaining job is to get it set up and working. The following is a report on the status of this construction program.

Access roads to Caue Peak from the railroad terminus had to be built, a distance of 5½ miles. These must support 15-ton trucks and 30-ton trailers. Complete, except for local widening.

Water supply comes from a 230-ft. dam, 20 ft. high through a concrete-lined tunnel 1,161 ft. long and a 3-mile 12-in. pipe line. This brings in 930,000 gallons daily for mine and town. The water treatment plant has yet to be built.

Transmission lines include the following: 69,000-v. line from powerhouse 26 miles away, completed in 1946; substations with transformers of 3,750-kva. capacity at the powerhouse and the town, completed in 1947; 69,000-v. line from town to mine's 1,100 level half mile away, completed in 1947; north substation with 2,000-kva. transformer, now under construction; 2,400-v. distribution lines to various working points on Caue Peak for powering equipment, total 8 miles, under construction.

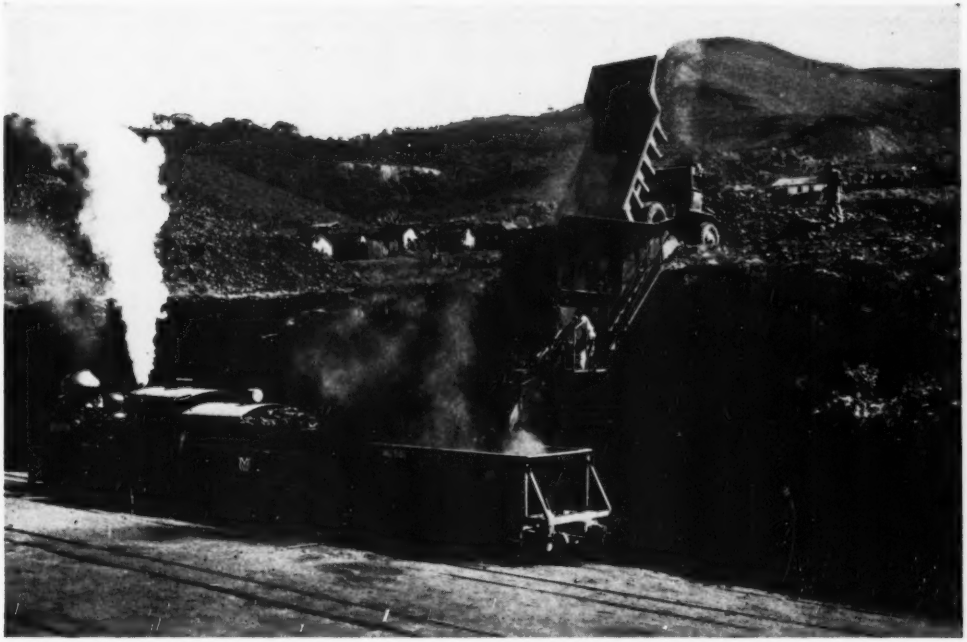
Housing, when completed, will

Itabira's iron ore moves from mine to coast

HARD, BLOCKY iron ore on Caue Peak must be drilled and blasted, and breaking costs run high compared with open pits in soft ores.

HAND LABOR at about $0.15 per hour still runs up costs, and impedes production, which will reach only 400,000 tons in 1949.

TRUCKS ARE RUNNING, but shovels are not. This 15-ton Euclid transfers load to 30-ton Easton trailer at half-way point on Peak.



WOOD-BURNING OLD-TIMER on narrow-gage track is big bottleneck for Itabira's output. The 375-mile haul to Vitoria over light, winding road-bed is far too long for size of trains that can be made up. Complete new broad-gage line seems only real answer.

take care of all facilities for about 300 families.

Other construction includes shops, warehouses, new railroad yards, offices, garages, etc., much is still to be built.

Because much of Itabira's iron ore has to come down off a mountain instead of up out of a pit, development of the mining method has involved some changes as the work progressed. The mining job will be handled about as follows:

1. Ore will be broken at the working faces up on the Peak (present level, 4,440 ft.), using churn drills supplemented by wagon drills.

2. Broken ore will be loaded by 2½-yd. electric shovels into 15-ton Euclid trucks or 30-ton Easton trailers for haulage to the crushing plant at the 3,600-ft. level. This is a maximum distance of 2½ miles on a favorable grade of 7%. The crushing plant will use an Allis-Chalmers 60x48-in. jaw crusher followed by two 20-in. gyratories. Capacity will be 5,000 tons per shift to about 3 in. in size.

3. From the crushers, the ore will be carried on a belt conveyor to a 6,800-ton surge pile.

4. From the surge pile the crushed ore, including all fines, is to be fed to the tunnel conveyor by means of a Weightometer-controlled ore feeder.

5. The tunnel conveyor will discharge directly on the first of four sections included in the down-hill conveyor system which drops 428 ft. over a length of 3,169 ft. For most efficient operation this should receive a constant flow of ore at the rate of 960 tons per hour. The down-hill conveyor and other systems were designed by Robins Conveyors Div. of Hewitt-Robins, Inc.

6. The down-hill conveyor will discharge on two 5-ft. width picking belts, which will permit the removal by hand of any remaining crushed ore which may be unsuitable for export.

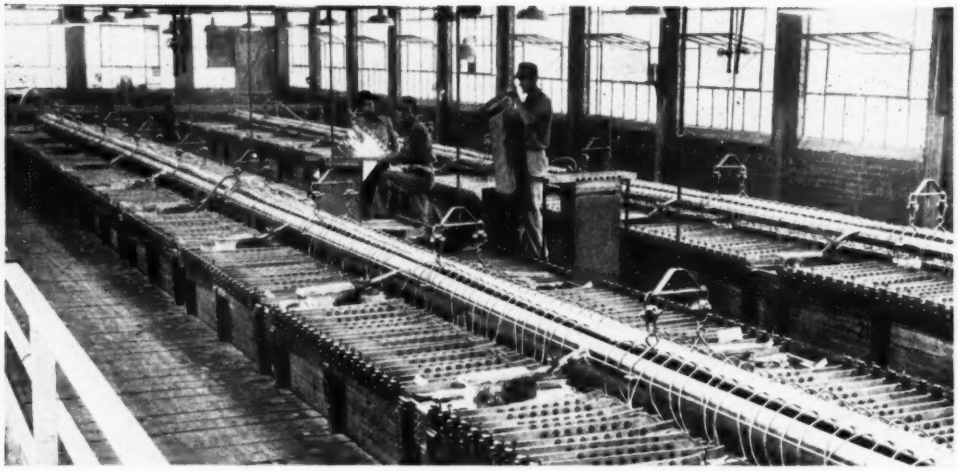
7. Ore from the picking belt will fall on vibrating screens designed to remove "fines" below ½ in. in size. These fines will be transported by means of a 24-in. conveyor belt to a stockpile near the eastern end of the ore bins. Three products can be separated from the ore: plus 3-in.; minus 3-in., plus ½-in.; and minus ½-in.

8. The coarse ore is removed from the screening plant upon belt conveyors, so designed that they may charge the ore to any desired part of the 200,000-ton ore storage bins.

9. In the tunnel under the bins, two 36-in. conveyor belts will be installed for the first stage of ore transfer from the storage bins to railroad cars. Ore drawn through openings in the roof, controlled by chute-gates, will feed on the conveyor, which will transport it to the 36-in. carloading conveyors. This belt will carry the ore to the 1,350-ton carloading bin located in the railroad yard.

Most of the equipment for the conveyor system crusher house is on hand. The crusher building is well on the way to completion and several thousand feet of the concrete forms for the conveyor system have been erected. Christiani and Nielsen, who are handling this project, are presently several months ahead of schedule. The entire crushing and conveyor systems are expected to be in operation by September, 1950. The entire handling operation from Caue Peak to railroad yards should be completed by July, 1951.

Data and other information for this article were supplied to *E&MJ* through the courtesy of Gilbert Whitehead, superintendent of the mines department of Cia. Vale do Rio Doce, S. A., and Howard Williams, director of the company.



PART OF THE CELL ROOM of the Electro Manganese Corporation's plant at Knoxville, Tenn. The flowsheet is shown opposite. From this plant in the ten years beginning with 1939 has come a total of 22,194,205 lb. of electrolytic manganese metal.

A Decade of Electrolytic Manganese

RUSSELL H. BENNETT

Chairman of the Board
Electro Manganese Corporation
Minneapolis, Minn.

PERFORMANCE in an electrorefining or an electrowinning operation is judged mainly by the over-all recovery of metal and the current efficiency. By these standards the Electro Manganese Corporation, in its production of manganese metal at Knoxville, Tenn., has achieved substantial progress. Recovery has been increased from the low forties to the high eighties, and current efficiency has been raised from the low fifties to the high sixties. However, these percentages by themselves cannot be used to compare this operation with other electrowinning processes, such as those for copper and zinc, owing to the unique nature of the electrolytic manganese process.

The Knoxville plant and process have been described elsewhere.[1] It is not my purpose here to deal at length with the technology of the process but to review certain economic facts and their bearing on the future of this relatively new industrial product, electrolytic manganese.

A flowsheet of the process, taken from Dr. Mantell's article,[1] is presented.

It is evident from it that the process is not simple nor comparable with the copper and zinc electrowinning processes. Certain considerations, fundamental in nature, will always circumscribe its application to manganese ores and limit the extent to which it will replace the standard, long established, pyrometallurgical processes. My reasons for this statement follow. I have endeavored to express them in terms as general as possible, consonant with the chemical factors involved, and have avoided specific values for the sake of simplicity. It should, however, be emphasized that proper evaluation of the electrolytic manganese process in industry can be made only by an engineer thoroughly familiar with the practical application of electrochemical theory as well as the theory itself.

Why Application of Flowsheet Is Limited

1. Manganese has a high negative value with respect to hydrogen in the electromotive series, and by reason of this is probably the last metal that can be plated out of aqueous solution.

2. The loss of current in heating solutions and evolutions of cathodic hydrogen will never be low. Promotion of hydrogen over-voltage has been remarkably successful, however, and is in large part responsible for the improvement in current efficiencies referred to.

3. A high content of buffer solution, which is ammonium sulphate, must be carried for conductivity and prevention of manganese dioxide precipitation in the cell, and this content, together with the manganese sulphate and the sulphates of the alkaline earth and alkali groups, results in virtually saturated electrolytes; this concentration of salts makes it necessary to control solution temperatures very closely. Sudden cooling would be disastrous; the electrolyte pumps, pipes and launders would be filled with crystals. As it is, even in the mild climate of Knoxville, there is a certain amount of unavoidable crystallization, with consequent trouble and expense.

4. Manganese is so active an element that re-solution in the cell can take place very rapidly, for a number of causes, principally from power failure. An interruption in power will cause the plates in the cells to "go black," that is, the man-

[1] W. L. Hammerquist, "Steel," 105, 42-5 (Oct. 30, 1939). Also E. M. Wanamaker and H. L. Chamberlain, unpublished paper delivered before Chattanooga, Tenn. meeting of American Chemical Society, Oct. 10, 1947. Also C. L. Mantell, J. Electrochem. Soc., 94, 232-43 (1948).

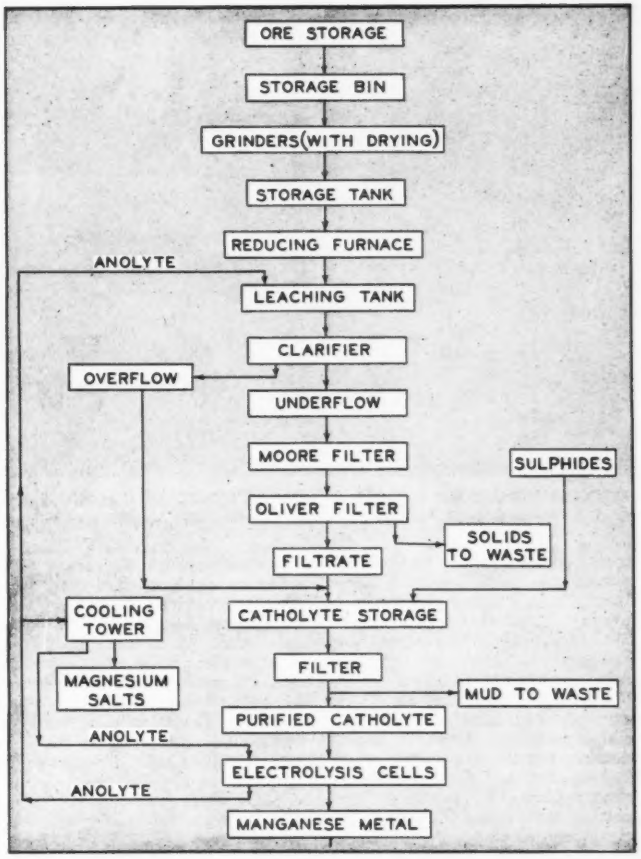
ganese on the cathodes re-dissolves, with evolution of hydrogen. A power outage of but a few minutes makes it necessary to pull all cathodes, of which there are 1,400 in the 70 cells now operating. In this respect, the power supply, purchased from the Tennessee Valley Authority through the Knoxville Utilities Board, is reliable.

5. Power requirements are much higher than in any other electrowinning work. The a.c. over-all consumption at Knoxville is between 5 and 5.5 kw.-hr. per pound of finished manganese metal. This compares with 1.5 kw.-hr. per pound for copper; 1.6 kw.-hr. per pound for zinc; 0.8 kw.-hr. per pound for cadmium; or, in electrorefining processes using aqueous solutions, 1.1 kw.-hr. per pound for nickel; 0.04 kw.-hr. per pound for lead; and 1.20 kw.-hr. per pound for iron.

6. The available manganese ores of the world require roasting before their metal content becomes acid-soluble. Roasting of ores (or mattes) is a part of other electrochemical processes, but in all except the manganese process this roasting is oxidizing in nature rather than reducing, and the latter is a much more difficult operation than the former. A large part of the efforts at Knoxville were devoted to finding a proper method and apparatus for this difficult operation. It has been successfully accomplished. Percentage of reduction to divalent manganese is about 99.

7. The electrolyte purity must be maintained at a very high level. Currently, the catholyte contains less than 1 mg. per liter of any impurity, excepting only some elements of the alkaline earth and alkali groups, which cannot be electrolytically deposited from aqueous solution.

8. The electrolytic manganese process is a two-solution system; that is, it has an anolyte and a catholyte. These solutions must be kept separate. This circumstance arises from the inescapable fact that manganese cannot be plated from an acid solution and manganese cannot be dissolved from its (reduced) ores in a basic solution. Thus we have to have a diaphragm cell, as in other established electrochemical processes such as the formation of pigments, of which white lead is an example, and nickel refining. However, conditions are much more severe in manganese electrodeposition. The necessity of running a diaphragm cell will always impose a considerable expense on the final product.

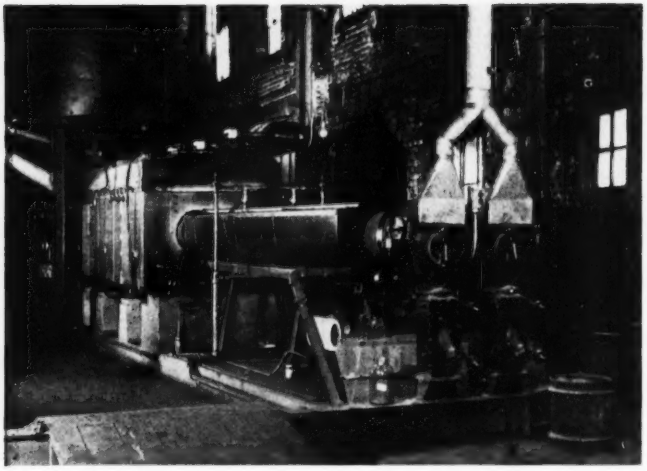


PROCESS FLOWSHEET for the electrowinning of manganese.

9. The electrolytes have proven to be extremely corrosive. Not only is there the free acid in the anolyte of about 30 grams per liter, but there is the phenomenon known as "salt creep," i.e., the growth (with a prying and spreading effect) of salt crystals, of a complex nature, wherever there is cooling or evaporation. Much effort has been devoted to the search for materials that would stand up in use in digestors, pumps, launders, tanks, cells, and other equipment. The solutions vary in temperature from 30 deg. C. to 50 deg. C. The preferred materials have come to be stainless steel, lead, wood and rubber. The wartime plant expansion program, in 1943, made under contract with the Defense Plant Corporation, demanded considerable quantities of these then critical materials, which the War Production Board deemed wise to allocate to the manganese plant.

This rather formidable list of reasons is given in an attempt to evaluate the economic position of electrolytic manganese in the industrial field, and to explain why it is a misconception, unfortunately rather widely spread, to think of electrolytic manganese as ever displacing standard ferromanganese, made by the long-established blast-furnace or electric-furnace, single-stage methods.

Ten years have elapsed since the Electro Manganese Corporation was organized. The company continues to be the sole commercial producer of the electrolytic metal. During the decade the trend in both production and sales has been



REDUCING FURNACE seen from discharge end. Tubes in firebox are of centrifugally-cast high-alloy steel. Heat is furnished by resistance elements under thermostatic control.

Production of Electrolytic Manganese in United States 1939-1948 by Producers, in Pounds

	Electro Manganese Corporation	Bureau of Mines	Total
1939	43,669	.....	43,669
1940	418,837	.....	418,837
1941	1,190,042	.....	1,190,042
1942	1,306,310	149,380	1,455,690
1943	2,385,486	464,690	2,850,176
1944	3,308,071	476,200	3,784,271
1945	3,398,569	280,336	3,678,905
1946	2,120,943	127,614	2,248,557
1947	3,499,181	.....	3,499,181
1948	4,523,097	.....	4,523,097
	22,194,205	1,498,220	23,692,425

one of steady growth. The price of manganese metal has come down from 42c. per pound (or less pure pyrometallurgical metal) in 1939 to 28c. (for electrolytic, carload lots delivered) in 1949.

During the first two years of the Corporation's existence, its efforts were devoted largely to research and experiment. Commercial production began in January, 1941. Before that, and for at least two years afterwards, the most perplexing and discouraging difficulties were encountered—difficulties which only the engineer who has had the experience of bringing a new, intricate process into commercial being can appreciate.

Much confusion exists in the metallurgical industry concerning priority of discovery and the relative roles in the U. S. Bureau of Mines and the Electro Manganese Corporation in developing the electrolytic manganese process. The facts are as follows:

The Knoxville plant was originally designed by Bureau of Mines personnel, following extended laboratory experiments. Its proposed capacity was 2,400 lb. of metal a day. Construction was completed in June, 1939. Unfortunately, many unforeseen difficulties appeared on an operating scale. The original plant was an almost complete operating failure. It had to be completely redesigned and rebuilt, after a period of new research and engineering. This was done by the technical staff of the Electro Manganese Corporation. All funds for development work and plant construction at Knoxville were furnished by private investors, and early operating losses were made up by them. In the new plant, the only features of the original design by the Bureau which were retained were the addition of SO_2 gas to the catholyte, which was discovered by Shelton and associates in the Bureau of Mines, the dimensions of the electrolytic cells, the use of a sulphate electrolyte and of ammonium sulphate as a buffer solution. The last two steps had been developed before the Bureau undertook its electrolytic research program—the use of manganese sulphate by Van Arsdale[2] in 1918 and of ammonium sulphate by Allmand and Campbell[3] in 1924.

Even after commercial operation began on Jan. 1, 1941, it was none too reliable, and production was subject to puzzling fluctuations. With increased knowledge of the fundamental nature of the operation, performance became steadier until today close control has been achieved. The installed capacity of the Knoxville plant is now 450,000 lb. of metal a month. The metal is about 99.98% pure.

The production of the Bureau given in the table was made in an experimental plant at Boulder City, Nev., in the years shown. This plant embodied many features different from the Knoxville commercial plant. However, the items of cathode-sheet composition and cathode-sheet process prior to electrodeposition were used as developed at Knoxville. The Knoxville plant continues to employ the SO_2 gas addition, as discovered by Shelton and associates of the Bureau; however, with further understanding of the function of this additional reagent, there has been developed a substitute, which has been used in the pilot plant with satisfactory results.

It should be noted that the addition to plant capacity completed in May, 1943, was financed by the Defense Plant Corporation. The sum advanced, however, has, with the exception of a small balance owing on a purchase contract, been entirely repaid to the Government by way of rentals and interest and purchase of facilities.

In passing, it may be noted that a little electrolytic manganese was produced in Japan during the war. It was of an impure grade.

Approximately half of the Knoxville plant's output has gone into ferrous manufacture and half into non-ferrous, including copper, aluminum, magnesium, and nickel-base alloys, and into chemicals. Customers and researchers have developed certain uses for which the metal, by reason of its purity, is indispensable. The sum total of such marketings is not large, however, and would not by itself sustain a commercial electrolytic manganese plant. The new product, which reached maturity in World

[2] G. D. Van Arsdale and C. G. Maier, *Trans.*, Amer. Electrochem. Soc. 33, 109-129 (1918).

[3] A. J. Allmand and A. N. Campbell, *Trans.*, Faraday Soc., 19, 559 (1924).

Electrolytic and Other Manganese and Ferromanganese

(APRIL, 1949)

Item	Typical Analysis					Selling Price in Cents per lb. of Contained Manganese—Carloads*			Remarks
	%Mn.	%Fe	%Si	%P	%C	Bulk	Packing	Total	
Electrolytic Manganese	Min. 99.98	Max. 0.001	Not Found	Not Found	0.004	....	....	28.00	Packed (steel drums) delivered, Eastern zone
Manganese Metal (Thermit Process)	95-98	2.0 to 2.5	1.0 to 1.5	?	0.06-0.20	35.5	....	35.5	Packed, delivered
Low-Carbon Ferromanganese, Special Grade	Approx. 90	Balance	1-2	Max. 0.06	Max. 0.07	25.25	0.75	26.00	Delivered
Low-Carbon Ferromanganese, Regular Grade	80-85	Balance	1-2	Approx. 0.18	0.10	24.75	0.75	25.50	Delivered
Medium Carbon Ferromanganese	80-85	Balance	Max. 1.5-2.5	?	Max. 1.5	18.15	0.75	18.90	Delivered
Low-Iron Ferromanganese	85-90	Max. 2.0	Max. 3.0	?	7.0	14.00	0.75	14.75	Delivered
Standard Ferromanganese	78-82	Balance	Max. 1.00	Max. 0.35	7.0	9.65	....	9.65	F.o.b. cars, bulk alloy, W. Va., Niagara Falls, N. Y., and Welland, Ont., cents per lb. of metal

*Carloads of 56,000 lb. (25 gross tons), except for electrolytic manganese which is 36,000 lb.

War II, has not been the beneficiary of a large-scale process analogous to zinc die-casting. It was this that gave electrolytic zinc such a prominent place in non-ferrous metallurgy. Electrolytic manganese, moreover, has had to make its way in competition with the various grades of pyrometallurgical manganese established in industry long before.

By far the largest part of the consumption of manganese is in the form of standard ferro, of the analysis and price given. It is difficult to ascertain the exact percentages of the total of standard ferro and other grades of ferro because detailed statistics are lacking. The division between standard and low- and medium-carbon ferro is, however, given in the "Minerals Yearbook," and on this basis the percentage of standard to total (excluding spiegel and other low-grade products) is about 96%. Medium-carbon ferro, used where carbon, phosphorus, sulphur, and iron limits permit, is, like standard ferro, produced and marketed at a price which has not as yet encouraged consumers to consider electrolytic metal as a substitute.

It is with the grades other than those of standard and medium-carbon ferromanganese that the new product has come to compete (except for the relatively few indispensable usages already mentioned). The grades other than standard and electrolytic are produced by multi-stage smelting operations long established in practice, but demanding not a little metallurgical skill and experience, and also ores of favorable analysis, particularly with respect to iron and phosphorus.

With the exception of manganese metal, pyrometallurgically produced (which now seems to have been relegated to a minor role), electrolytic manganese is at a price disadvantage which ranges from 2c per pound (packed and delivered) in the case of low-carbon special grade, to 14.75c. in the case of low-iron ferromanganese. Yet it is interesting to note that electrolytic is used in competition with all these lower-priced grades.

The degree of competition probably cannot be analyzed in detail because metallurgical practice and accounting methods vary with each company that uses high-purity manganese, and indeed within various plants of the same company. In steel, electrolytic manganese is used almost exclusively in stainless steels, tool steels, and special alloy steels. Among companies making these products, certain ones use electrolytic manganese exclusively, others use it in part, and others do not see an advantage equal to the price differential. The same may be said about non-ferrous and chemical manufacturers.

What constitutes an impurity will vary with the nature of the product. Thus the steel metallurgist will not object to iron, but will object to carbon, sulphur and phosphorus. The aluminum metallurgist will object to iron and in certain cases to silicon. The manufacturer of manganese chemicals will object to whatever elements other than manganese are taken up in his solutions, or, if taken up, are harmful to his product.

Probably there are as many ways of calculating the relative advantages of electrolytic and other high-purity manganese as there are metallurgists to calculate. If there is any trend in preference, it is toward the highest grade for manufacture of high-purity products. The following testimony of an industry witness before a Congressional Committee is enlightening in this respect.[4]

"Each alloying addition, such as manganese, contributes to the chemical analysis of the stainless steel being made. Electrolytic manganese contributes no undesirable

[4] L. F. Weltzenkorn, Superintendent, Armco Steel Corporation, Metallurgical Department, Rustless Division.

carbon, sulphur, or phosphorus when it is added to a melt of stainless steel.

"These chemical and metallurgical factors are important in the production of stainless steels of the highest quality and governed our company's decision to adopt electrolytic manganese in preference to other less expensive materials."

Wider Use Depends on Price

Obviously the volume of electrolytic manganese that will be used in industry is a function of its price. There is probably no consumer who would not use it in preference to any other form of manganese if prices were equal. From the brief review given of some of the metallurgical factors involved in its production, it should be apparent that for the great bulk of consumption (standard grade), costs can never come within hailing distance of the simple, single-stage blast-furnace or electric-furnace method. It is very difficult to envisage any discoveries which will invalidate this statement. For other purer products produced in very much smaller quantities but very important withal to modern industry, the choice of material will depend on many variables, with the very high purity of electrolytic manganese tipping the scales in its favor, as modern metallurgy evolves new products for ever more severe conditions of usage.

The trend in the price of electrolytic manganese has been consistently downward. In 1942 it was 40c. a pound (carload delivered basis) and it is now 28c. This reduction has taken place during a period when costs of production have been strongly upward, as measured by the Department of Labor index. For example, the increase according to this index has been (from 1942 to 1949) 101% for non-ferrous metals and 74% for iron and steel.

While the more obvious savings in the process have perhaps now been accomplished, there remain many interesting possibilities for further progress, a certain number of which research and engineering will translate into actualities. One major item on the cost sheet is wholly uncontrollable by the company and this is the price of ore. Since the close of 1946 it has shown an appreciable increase.

The company maintains a research staff, which is constantly seeking ways to improve plant practice and reduce costs. One of its most important functions is to ascertain the suitability of any particular ore. This is done not only by complete chemical analysis but by pilot-plant testing, in which large-scale plant conditions are closely simulated. Such tests have been made on almost all ores that move in commerce. Commercial-scale plant runs have been made on many of them, both foreign and domestic, including Chamberlain nodules, Anaconda nodules, Batesville carbonate ore, and several Appalachian dioxide ores.

Domestic ores have, unfortunately, one or more undesirable properties for the electrolytic process. Some carry appreciable amounts of magnesium, which causes the precipitation of a complex salt containing sulphates of ammonia, magnesium, manganese and calcium, with consequent loss of the valuable ammonia and manganese contents. There are certain impurities that, even in minute quantities, inhibit plating and that present purification processes do not remove. Quoting from Wanamaker and Chamberlain:[5]

"Unlike some other electrolytic processes, impurities in the catholyte do not deposit with resultant impairment of current efficiency, but some impurities inhibit manganese deposition in favor of hydrogen evolution. It would be poor judgment to base an electrolytic manganese plant on a certain mine, unless the most exhaustive tests had first been made. It is not intended to give the impression that only a few particular ores can be treated. We can, with suitable flowsheet changes, manage to use most ores, but it is expensive and unpleasant to make these changes."

Plant Would Be Larger for Low-Grade Ores

All large domestic orebodies so far discovered are unfortunately low-grade and lend themselves poorly to known methods of concentration, with the exception of the rhodochrosite ores of the Butte district. This fact imposes the condition that any electrolytic plant for these ores must be larger for a given output than a plant to treat high-grade imported ores. As an illustration, the residue from Chamberlain nodules would be twelve times as great as that from the ore mixture which the Knoxville plant is currently using. The effect of this on over-all recovery to metal is readily apparent to an experienced metallurgist.

[5] Reference cited.

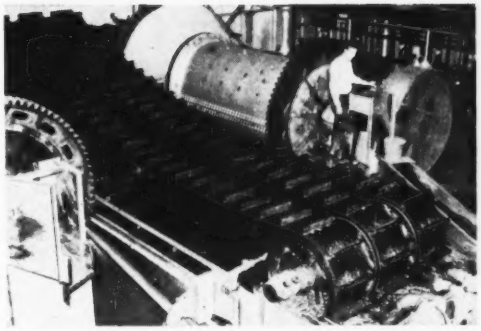
Chamberlain nodules, while very low-grade (as received at the plant they averaged 17.12% Mn), still constitute in the mass the greatest domestic reserve of manganese. Apart from the factor of recovery, the amount of nitrogen in the form of ammonium sulphate needed for treating them would, on the basis of experience with electrolytic manganese, be so great that no plans for construction should be made until we know where this nitrogen is coming from.

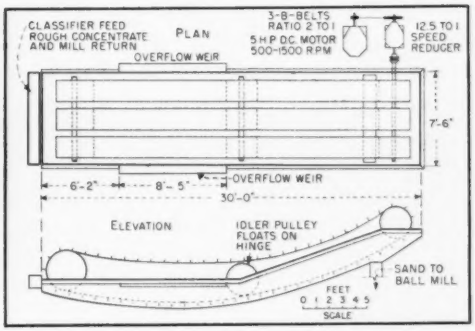
More Research Imperative for Domestic Manganese

The problem of domestic manganese is one of research and experiment for the production of concentrates suitable for blast-furnace or electric-furnace smelting directed to the production of standard-grade ferromanganese. In that 96% or more of all manganese produced falls in this classification, the situation is most acute. Blast-furnace smelting is a large-volume, low-cost operation. It would seem that national security makes it imperative now to assemble a group of experienced metallurgists to attack the problem of concentration of domestic low-grade ores. Much work, to be sure, has been done, but the results are not properly correlated, nor are new techniques adequately looked into.

The choice of ores for an electrolytic manganese plant is a complex subject, one upon which a volume could be written based on experiences at Knoxville. Any low-grade ore imposes very great expense, not only for operation but for construction, over high-grade ore. No plant operating on a single ore can in all probability be as economical as one so located as to draw upon a variety of ores. The correct blending of ores is even more important than in the case of a non-ferrous smelting operation or an electrolytic zinc plant. In the electrolytic zinc process the experience as to the nature of the plant feed has been parallel to manganese, that is, the higher the grade the better.

The Knoxville plant is currently running on a mixture of three high-grade imported ores. It is performing steadily and consistently, and its produce has made available a new material for the advance of modern industry. From an early and difficult beginning production has been brought under careful control until now the process can be said to be, in experienced hands, reliable and controllable.





IMPROVED CLASSIFIER makes 200-mesh separation in regrind circuit in Magma's new mill. Note tank's catenary bottom.

TABLE 1—STRUCTURAL DATA

Size of drag belts—18", 8-ply belt, 1/8" cover both sides.
Head pulleys—Sprout-Waldron self-cleaning pulleys, 30" dia., 20" face.
Idler pulleys—Single-arm cast-iron pulleys, 30" dia., 20" face.
Tail pulleys—Single-arm cast-iron pulleys, 36" dia., 20" face.
Bearings—4 15/16" dia. heavy-angle pillow blocks, grease lubricated.
Rakes—3½"x3½" angles, rubber tipped, spaced at 1'-0" along belts.
Drive—See drawing in upper right.

TABLE 2—OPERATING DATA

Belt Speed—19.5 ft. per min.
Head pulley speed—2.247 rpm.
Power Consumption—0.94 hp.
Dilution of Classifier Overflow—20.0 percent solids.
Dilution of Classifier Feed—25.0 percent solids.
Dilution of Regrind Mill Discharge—65.0 percent solids.
Feed Rate—17.5 tons per hour.
Circulating Load—103 percent.

TABLE 3—SCREEN ANALYSIS OF REGRINDING CIRCUIT PRODUCTS

Mesh	Classifier Overflow, Percent	Classifier Feed, Percent	Classifier Sands, Percent	Regrind Mill Discharge, Percent
On 65	0.0	0.5	0.5	0.0
On 100	0.1	1.5	1.5	0.2
On 200	1.5	18.0	22.5	7.5
On 325	7.3	19.5	45.0	32.0
Through 325	91.1	60.5	30.5	60.3
TOTAL	100.0	100.0	100.0	100.0

For Lower-Cost Regrinding

FRANKLIN T. DAVIS
Plant Metallurgist
Magma Copper Co.
Superior, Ariz.

AS A PART OF ITS CAMPAIGN to improve metallurgy and reduce milling costs, Magma Copper Co., Superior, Ariz., has designed, built, and is now operating an unusual Esperanza-type classifier in a special circuit for regrinding copper flotation concentrate. Magma uses this classifier in its new 2,500-ton concentrator.[1]

Regrinding at Magma grew out of tests begun in the old mill in 1945 looking toward a better grade of concentrate. Full-scale tests showed that regrinding of rough copper concentrate, followed by cleaning, raised the final grade without causing significant loss in the tailing. This first regrind circuit used a 5x10-ft. tube mill closed with a single-belt Esperanza, which had 57.5 sq.ft. of pool area. Using 2-in. balls, this ground rougher concentrate to 85-90% minus 200 mesh.

This practice improved metallurgy, the best results coming when regrinding was finest. To get even finer grinding, a two-belt Esperanza was built in 1947. This machine differed from the first classifier in these ways: increased pool area, increased weir length, decreased belt speed, shallower pool. In the mill, ¾-in. balls replaced the 2-in. balls. This circuit ground rough concentrate to 99% minus 200 mesh.

When Magma's new mill was begun in 1947, the Esperanza type was chosen for the regrind section. In designing this third model, we corrected certain weaknesses of earlier machines.

The flat bottoms of the first classifiers are replaced by a catenary-shaped bottom that conforms to the hang of the scraper belts. This greatly reduces wear of rakes and tank, cuts power consumption, and avoids having the belt hang up after a shutdown.

High belt speed in the first classifiers caused trouble through excessive turbulence, yet there were times when higher belt speed would have been helpful. Therefore, the new classifier's belts are driven by a variable-speed d.c. motor so that the speed of the belt can be adjusted properly to operating conditions.

Sand settles on the underside of the belt and causes slippage and heavy wear at the head pulley. To minimize this effect, the new classifier uses self-cleaning head pulleys, sprays,[2] and a belt scraper.

The classifier can be run in closed circuit with two 5x10-ft. tube mills charged with ¾-in. forged-steel balls. One mill has handled the load up to the present.

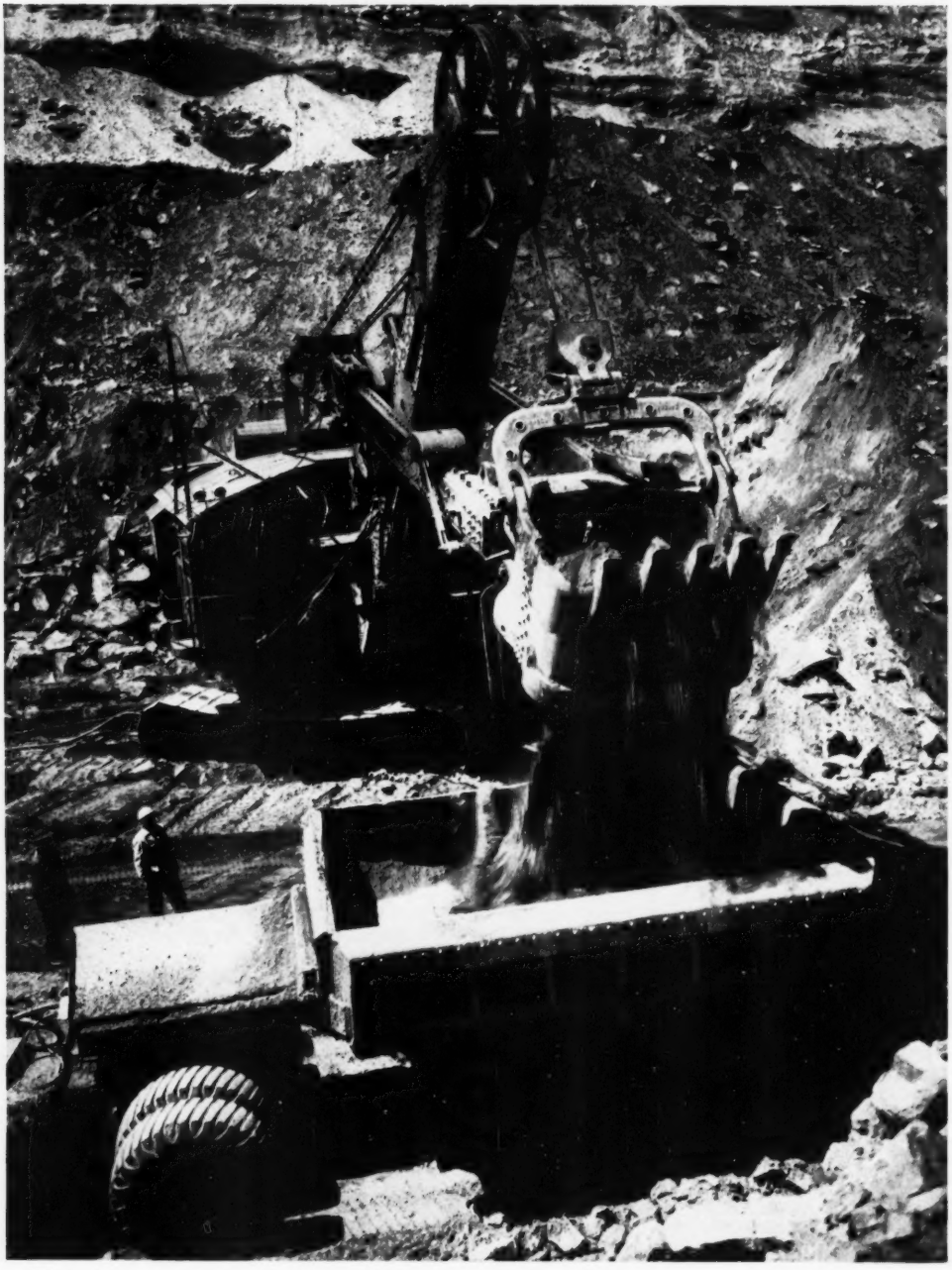
I do not believe this classifier has general application in primary grinding circuits, where wear and load conditions are usually severe. For a regrind circuit such as ours, we have found the Esperanza type to offer the advantages of low first cost, low power consumption, and excellent classification.

I wish to thank the following for aid in designing this classifier: Halder Rex, mill superintendent, Magma Copper Co.; J. W. Thompson, consulting metallurgist; W. E. Meals, design engineer; A. C. Munro, mill superintendent, Britannia Mining and Smelting Co. I am grateful to the Magma Copper Co. for permission to publish this.

[1]Rex, Halder. "A Mill Designed for Easier Operation." E&MJ, December, 1948.

[2]Hatch, W. G. "Britannia Classification." *Mining World*, April, 1947.

Open-Pit Maintenance Costs



TRAIL-CAR BOTTOMS faced with manganese-molybdenum steel still hold up after three years' service. (See p. 88 for details.)

Cut With New Alloy Steel

REINFORCING BARS on shovel's dipper stick are inspected by Art Johnson, Hill-Annex master mechanic. Alloy-steel bars have lasted seven months against mild steel's average of two months. Bars take heaviest punishment digging frozen ground in winter.

RUN-OF-MINE ORE from Hill-Annex pit on the Mesabi is dumped from 30-ton trail cars into alloy-steel-lined ore pocket. In 1948 season, this pocket caught over 3,000,000 tons. Liners lasted all 6½-month season. Mild steel, in same service, lasts six weeks.

Combining manganese and molybdenum, new alloy steel lasts longer, saves labor, gives more efficient operation at five Mesabi mines and beneficiation plants.

MAINTENANCE MEN for the Inter-State Iron Co., Jones & Laughlin subsidiary on the Mesabi range in Minnesota, have come to know the parent company's Jalloy steel as "that hard stuff." They have seen this new manganese-molybdenum steel as chute plates, truck bottoms, bang-boards, baffle plates, wear plates, shovel dipper-stick reinforcing, and special studs during the most complete and exhaustive field tests it has undergone since it first was introduced in 1947. Wherever abrasive wear was eating through mild steel, wherever impact and abrasion were creating a costly maintenance problem, out came the mild steel and in went the new material.

Results obtained from these replacements have interested the company's engineers and metallurgists also. This steel has been designed specifically to give abrasion and impact resistance. Heat-treated plates of it showed a yield strength of 160,000 psi. as compared with 25,000 to 30,000 psi. for mild steel not heat-treated, and a Brinell hardness of 341 to 388, as compared with 99 to 126. It cost approximately twice as much.

Slowly during the past three years the story has unfolded. Generally, the new steel has lasted four to six times longer than the mild steel it replaced, saving more than half the cost of steel for applications where used. It also has saved several thousand man-hours of work on replacement installations and it has likewise contributed thousands of tons of ore through greater production efficiency.

Heat-treated plates of the manganese-molybdenum steel are so hard they cannot be cold-formed. They must be cut to fit flat dimensions. This is usually done at the Inter-State company's mines with acetylene burning equipment. No difficulties have arisen here. The plates are fastened in position, either by bolting or welding, or both in some cases. Holes for countersunk bolts are drilled with standard high-speed equipment. Plates are then bolted to a framework of wood or mild steel.

In welding the new alloy steel, the Inter-State men found the answer in a weld metal from ferritic electrodes with a stainless-type coating and a special welding technique. Using these special rods, they welded the plates together by skip-welding 6-in. weldments 12 in. center to center, done in two passes to make a continuous weld. Because of the ductility of the weld metal and of the low heat that is

Service Obtained With New Manganese-Molybdenum Steel at Mines of Inter-State Iron Co., Virginia, Minn.

Description of Use	Operating Conditions	Plate Dimensions	Service Life with Jalloy	Previous Mild Steel Service	Additional Savings, Man-Hours, Production
GENERAL					
Bottoms in 19 rebuilt 30-ton Austin-Western trail cars.	Abrasion and impact from ore and rocks up to 4 ft. in diameter falling 3 ft. to 6 ft. during loading.	¾-in. plate, 10 x 15 ft. over 2 in. wood and ¼-in. mild steel lining.	Some of these plates have been in service as long as 3 years. None have been replaced to date. Trail cars average 60 to 75 trips per day carrying an average of 1,800 to 2,200 tons per day in year-round all-weather operation.	About six months.	As much as 320 per installation. Production savings as high as 7,000 tons per installation.
HILL ANNEX MINE					
Main ore-pocket chute liner.	Abrasion and impact from crude ore up to 4 ft. in diameter falling 8 ft. to 16 ft.	Jalloy 1-in. plate 48 ft. x 20 ft. narrowing to 6 ft. at bottom. Mild steel — ½-in., same size.	Lasted entire season of 6½ months and is still serviceable. Volume of 3,000,000 tons during 1948.	Three to six weeks.	4 men, 16 hours per new installation—saving approximately 240 man hours per installation.
Transfer chute from feeder to conveyor belt, main ore pocket.	Abrasion and impact from screened crude ore, 4 in. in diameter and under, falling 6 ft. to 8 ft.	1-in. plate, 2 x 4 ft.	Approximately 1 month —six plates used during 1948. Volume over 2,500,000 tons during 1948.	One week.	2 men, 2 hours per new installation—saving approximately 12 man-hours per plate used.
Washer plant baffles in three crude ore pockets to break fall of ore from hopper car onto feeder belt.	Abrasion and impact from crude ore, 4 in. and under, falling 6 ft. to 8 ft.	1-in. plate, 52 in. x 12 ft., two baffles in each of three pockets.	20 months—volume over 1,800,000 tons in three pockets.	Nine months.	4 men, 16 hours per new installation—saving approximately 48 man-hours per plate used.
Side strips on three pan conveyors, from crude ore pocket.	Sliding abrasion from crude ore, 4 in. and under, moving at 20 ft. a minute.	1-in. plate, 4 in. x 20 ft. on each of three conveyors.	One full season—volume of 600,000 tons per conveyor during 1948—still serviceable.	Three months.	8 man-hours saved per plate used.
Crude ore feeder discharge chutes from three ore pockets.	Abrasion under water pressure, after crude ore 4 in. and under falls 3 ft.	1-in. plate, 3 ft. wide at base, triangular shape.	One full season—volume of 600,000 tons per chute during 1948.	Three weeks.	32 man-hours saved per plate used.
Vibrator discharge chute from three vibrators.	Abrasion under water wash from crude ore concentrate ¼ in. in diameter to 4 in.	¾ in. plate, 5 ft. long x 3 ft. wide narrowing to 2 ft. at bottom.	Six and one-half months. Volume of 240,000 tons per chute during 1948.	One month.	2 men, 4 hours per new installation. Approx. 40 man-hours saved per plate used.
Log discharge chute, three across battery - classifier feed chute and concentrator.	Abrasion under water wash, ¼ in. ore and under falls 7 to 8 ft.	1-in. plate on saddle. ¾-in. plate liner.	Six and one-half months —volume of 200,000 to 250,000 tons during 1948.	Two months.	8 hours, three men per installation. Approx. 50 hours saved per installation.
Classifier loading chute wear plate.	Abrasion under water wash from concentrated ore ¼ in. and under.	¾-in. plate, 1 in. x 3 ft.	Three months — volume 250,000 tons during life of plate.	Two weeks.	6 man-hours saved per plate used.
Coarse concentrate loading chute wear plate.	Wet abrasion from concentrated ore ¼ in. up to 4 in.	¾-in. plate, 1 ft. x 3 ft.	One month, volume of 40,000 tons per plate.	One week.	4 man-hours saved per plate used.
Bang board, coarse concentrate loading chutes.	Abrasion and impact under water wash from ore 2 in. and under.	¾-in. plate, 18 ft. x 8 ft.	One month, volume of 40,000 tons per plate.	Six days.	10 man-hours saved per plate used.
Top and bottom on two Bucyrus-Erie 1/0 shovel fronts with 5-cu. yd. bucket and Marion 4101 with 3-cu. yd. bucket.	Shock loading and rolling abrasive wear.	1½-in. plate, 6 in. x 22 ft.	Used seven months without breaking. Both 5-yd. shovels moving approx. 600,000 cu. yd. in all-weather service. Still in use.	Two months.	More than 20 man-hours saved and more than 5,000 tons of production to date.
Bolts for pulling bearings and for shovel booms and dipper sticks.	High - tensile strength required.	1-in. round, threaded.	Three times that of mild steel average.		
GRANT MINE					
Main ore-pocket plates.	Abrasion and impact from ore up to 3 ft. in diameter falling approx. 6 ft.	¾-in. plate, 3 ft. x 15 ft.	Lasted full season of six and one-half months during 1948, volume of 380,000 tons.	Two months.	48 hours saved per plate used.
Ridge plates crosswise on discharge chute for wash ore.	Abrasion and impact under water wash from ore 4 in. in diameter to ¼ in. falling 3 ft.	A series of twelve ½-in. strips on edge 3 in. high and 24 in. wide.	Three months — volume of 100,000 tons.	One week.	28 man-hours saved per installation.
COLUMBIA MINE					
Side plates in main ore-pocket chute.	Abrasion and impact from ore and rock up to 4 ft. in diameter falling 12 to 20 ft.	½-in. plate, 12 x 8 ft. on both.	Two full seasons, thirteen months—volume of more than 1,400,000 tons total.	Three months.	Approx. 320 man-hours saved per installation.
Loading pocket, fine side.	Abrasion and impact in wash water of concentrate ¼ in. in diameter and under, falling 14 to 16 ft.	½-in. plate, 8 ft. x 16 ft.	Six and one-half months —volume of 240,000 tons last year. Still serviceable.	Two months.	72 man-hours per plate installation.
Loading pocket, coarse side.	Abrasion and impact from ore 3 in. in diameter to ¼ in. falling 14 to 16 ft.	½-in. plate, 8 ft. x 16 ft.	Fifteen days—volume of 130,000 tons.	Four days.	108 man-hours saved per installation.
Merch-pocket loading chute.	Abrasion and impact from ore 3 in. and under, falling 8 to 10 ft.	½-in. plate, 8 ft. x 16 ft.	Six and one-half months during 1948—volume of 180,000 tons. Still serviceable.	Seven weeks.	Approx. 80 man-hours saved per installation.
LONGYEAR MINE					
Main crude ore chute, main ore pocket.	Sliding abrasion from crude ore 4 in. in dia. and under.	⅝-in. plate, 28 in. x 4 ft., ½ in. plate side liner.	Average of 10 weeks, volume of 350,000 tons per plate.	Four weeks.	24 man-hours saved per installation.
Bang board, main ore pocket, and at end of main belt from screening plant to loading pocket.	Abrasion and impact from crude ore 4 in. and under, falling approx. 3 ft., as it leaves conveyor belt, hitting plates at a rate of 425 ft. to 450 ft. a minute.	½ in. plate, 40 in. x 40 in.	Average 7 weeks volume of 6,000 to 7,000 tons daily.	Three days to two weeks.	4 man-hours saved per plate used.

CHUTE PLATES, of ½-in. alloy steel, at Columbia mine carried 240,000 tons of fine concentrate last season. This is triple the life of mild steel on the same job at this Mesabi washing plant.

ALLOY-STEEL LINERS in Grant mine's pocket, caught 380,000 tons last season. B. J. Marinello, shop foreman, checks wear of plates. Mild steel plates formerly were replaced three times each season.

built up in the plates, the weld made is sound.

As these fabrication methods were worked out, the new plate began to go into a variety of places in the Inter-State company's five active open-pit mines near Virginia and Hibbing. As the mild-steel plates wore out, they were replaced with it as fast as it could be supplied. By the start of the 1948 ore season, it was in nearly every major application for which it was suited, at all the mines.

For the screening and washing plants on the Mesabi the season lasts approximately six months, from late in April until cold weather shuts them down. During the winter, most of the activity at these plants centers around repairs and replacements and preparation for the next season.

New Steel Lasts a Season

The new alloy steel is fitting into this cycle of operations far more efficiently than mild steel. By selecting proper plate thicknesses, the Inter-State maintenance men are making installations that, it is estimated, will last a full season in many cases. This is especially true

TWO FULL SEASONS were handled by these ¾-in alloy steel liners at Columbia mine. Joe Ratai, maintenance man, checks main ore pocket.

in locations such as the main ore-pocket chute liners, where the wear is continuous, and failure may not only result in costly overtime repair but hold up production as well.

In such applications the plate may be replaced at the end of the season, even though still serviceable, to avoid risk of interrupting production during critical rush days. If it has lasted only twice as long as mild steel in these applications, it is still less expensive than mild steel which fails in mid-season.

Stands Sub-Zero Cold

Some outdoor operations, such as the stripping of overburden, continue on a year-round basis at the mines. During the sub-zero weather of the Minnesota winter, power shovels have to work against frozen ground and rock. The impact and abrasive wear on trailer-car bottoms is greater than in the mild weather. Under these severe conditions, the new heat-treated alloy does not become brittle. On trailer bottoms and as reinforcing on dipper sticks, it has continued to give the same performance records that it gives as chute plates.

Representative results to date are summarized in the accompanying table. The applications listed are typical, but the tabulation is by no means complete. The heat-treated plates are used in nearly 35 other places, and new applications are developing from time to time.

LOADING NITRATE IN BULK onto a ship at Iquique. The stream falling from the end of the conveyor is coming from one of the loading towers shown in the picture at the right. In the right background can be seen the unfinished roofs of the two storage plants.

Improved Handling Cuts Nitrate

FERNANDO BENITEZ

Caja de Credito Minero
Santiago, Chile

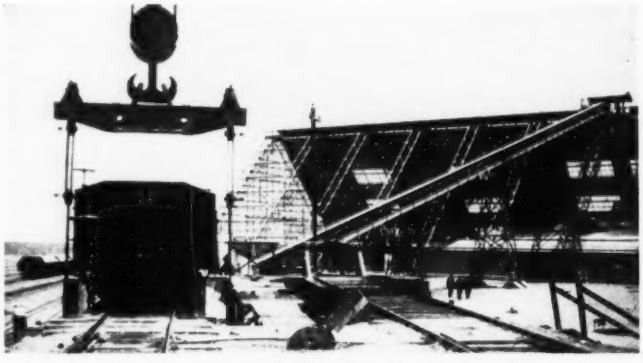
FACILITIES FOR STORING and handling nitrate have been provided at Iquique, Chile, which greatly simplify and lessen the cost of loading ships at this port. Previously the work of handling 1,600,000 metric tons of nitrate per year required much labor and time. There was no means of storage, and whenever a boat had to be loaded it was necessary to accumulate a very large number of railroad cars. The new facilities described here were designed and built by Cia. Salitrera de Tarapacá y Antofagasta, the Chilean Government financing one-sixth of the cost and the nitrate industry the remainder.

In addition to effecting an appreciable reduction in the cost of loading nitrate, the new scheme permits an even movement of nitrate by rail from the plants in the interior to the port of shipment, and reduces the ocean freight by cutting demurrage on ships in port.

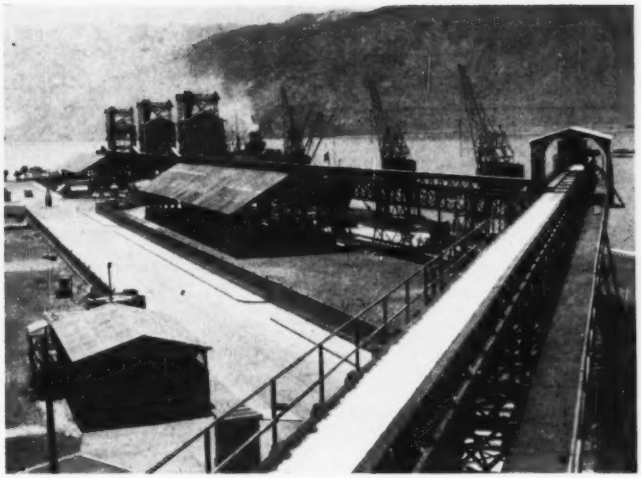
Trains bring the nitrate to the port from the processing plants which are situated at distances varying from 31 to 160 miles. On arrival, the cars are shunted onto sidings, where a locomotive takes them one at a time up an inclined plane to the top of a concrete bin. Two of these bins were provided because there are two railroads of different gages bringing the nitrate to the port. One of them, belonging to the government, has a gage of 1 meter (39.4 in.) and the other, a British railroad, is of standard gage.

The railroad cars are provided with a gate in one end. Once spotted, a car is dumped through this gate by lifting the opposite end with a 35-ton crane at an angle of 45 deg. to 50 deg., the angle depending on the moisture in the nitrate. Seven 35-ton cars can be dumped per hour.

The nitrate is drawn from the bins by two apron feeders, both of which deliver to a belt-conveyor system which takes the nitrate to one of two covered storage plats. Sides and trusses of the structure over each plat are of structural steel. The roof is of Transite, made



DUMPING A CAR of nitrate with crane and tilting section of track. Beyond the dump is a conveyor which elevates nitrate to top of structure over storage plat.



CONVEYOR SYSTEM (scale house upper right) delivering nitrate to tower for loading ship (upper left). Two towers are in service, with a third building at time picture was taken.

Industry's Costs

in the country. Floors have been built of vibrated concrete laid upon a base of crushed stone which was rolled down before pouring the concrete. The floors slope slightly toward the center line of the plat, likewise launders are provided at intervals. The structure over each plat has 36 windows in the roof, each being 20 meters square (214 sq.ft. each). Each end also has a window surface which covers practically the whole area. Instead of glass, a semi-transparent plastic is used, known as "Vimlite plastic mesh."

Capacity of the two plats is 88,000 short tons of nitrate. This capacity, it has been calculated, will make it possible to compensate for seasonal fluctuations in the amount of nitrate exported, so that the tonnage shipped to the port from the plants can be practically the same every day of the year.

The two plats are next to each other with an aisle bewteen. Under the aisle a tunnel has been built of reinforced concrete with its roof on a level with the floor of the plats. In the roof are 12 openings, each 3.28 by 6.56 ft. Pay-Loaders shovel up the nitrate from the plat floor and carry it to these openings and dump it on to the conveyor below. Bulldozers or other suitable equipment can also be used.

To regulate the quantity of nitrate delivered to the belt, three movable automatic feeders are provided, each of which can be shifted below any one of the 12 openings in the tunnel roof. This equipment is operated by push-button control. Space has been provided to install another conveyor alongside the one already provided. Two Weightometers are installed in the conveyor system, which serve to check the weight of nitrate handled and each other.

Nitrate can be delivered to the ships either in bulk or in sacks. When it is being delivered in bulk, it is discharged directly into the ship's hold. Each loading tower can deliver 330 short tons of nitrate per hour, though the combined capacity of the three towers cannot be greater than the capacity of the belt.

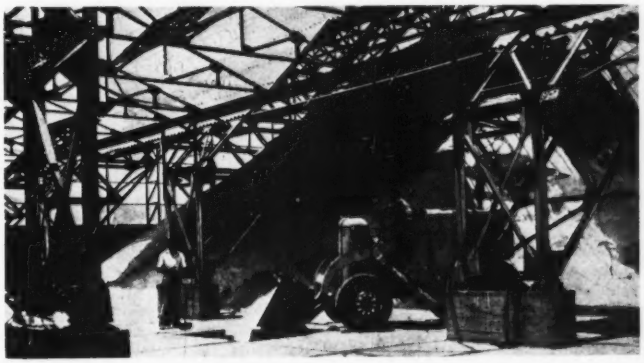
To load sacked nitrate, each of the towers has been provided with four automatic weighing, sacking and sewing machines having an individual capacity of 110 short tons per hour, or 330 short tons for the three towers.

Electric power is provided by the Iquique power plant. Total power consumption is 0.80 kw.hr. per ton, including everything from the crane that tilts the cars to the towers that deliver to the holds. By this system about 550,000 short tons of nitrate per year will be loaded, half in bulk and half in sacks. All idlers have roller bearings and a sufficient number are self-aligning.

Loading towers, feeders and idlers were provided by Robins Conveyors, Inc.; motors by Allis-Chalmers and Westinghouse; speed reducers by Falk; transformers by Brush Electric; Weightometers by Merrick; sacking machines by Richardson, and the sewing machines by Union Special Machinery Co.

The project was designed by the Cia. Salitrera's Chilean engineers, who consulted on details of port problems with the Government's Harbor Department.

Cost of the project is put at two million dollars. The sum includes a special indemnity paid to 250 longshoremen who were left idle and transferred elsewhere when the plant was put into operation.



NITRATE is transferred by Pay-Loader from floor of storage plat to opening in floor over conveyor system that delivers to towers for loading ship.

OPEN-PIT MINE of Simplot Fertilizer Co., 16 miles east of Fort Hall, Idaho. Bulldozers and scrapers remove top soil. Phosphatic shales overlying main bed are removed with 2½-yd. shovels. The high-grade oolitic "main bed" is mined with ¾ to 1½-yd. shovels to permit greater selectivity in mining. A 22-mi. spur track connects the mine with the Union Pacific R.R. at Fort Hall.

How Simplot Solved A

HEATH B. FOWLER[1]

Chief Engineer, General Exploration
Simplot Fertilizer Co.
Pocatello, Idaho

SURFACE MINING OPERATIONS of the Simplot Fertilizer Co. are situated on the Fort Hall Indian Reservation about 16 miles east of Fort Hall, Idaho. The Phosphoria formation outcrops in Township 4 South, Range 37 East, Boise Meridian. Ownership of the phosphate-bearing land is divided between individual Indians and the Bannock-Shoshone Tribe, and royalties are paid to the respective owners on a tonnage basis, as mined. Geology and mineral resources of the Fort Hall Reservation were studied by the U. S. Geological Survey in 1913 and reported on in 1920.[2] Exploratory work was undertaken by private enterprise in 1945. Diamond drilling was started in April, 1946, and stripping operations in June. A camp was established near the south end of the Phosphoria outcrop, and 18 miles of oil-surfaced highway was built to provide an outlet to railroad facilities near Fort Hall.

The stratigraphy of the Fort Hall phosphate beds is similar to that found throughout southeastern Idaho. See illustration above. Major faults and fault zones, which have a definite northeast-southwest pattern, are an important consideration when laying out the stripping and mining panels. The phosphate beds generally dip 6 to 12 deg. in a southeasterly direction and strike from north 5 deg. east to 45 deg. east, giving assurance of a fairly flat-lying deposit for future strip-mining.

High Stripping Ratio

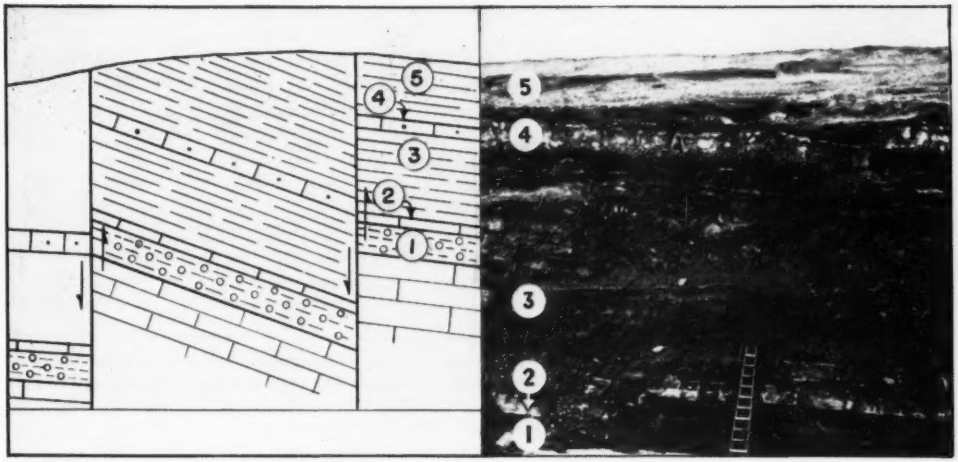
During the first year of operation at the Fort Hall mine, a total of 53,000 short tons of main bed phosphate rock was mined and hauled to Pocatello, 35 miles southwest, for processing into superphosphate. This production was primarily a large-scale sampling and experimental test to determine the feasibility and the economics of mining and processing phosphate rock from a virgin portion of the western phosphate field. During 1947 contracts were made with a department of the U. S. Government to furnish a large tonnage of phosphate rock for export to Japan. This contract, together with an increased expansion in the company's processing requirements, necessitated a rapid expansion in the stripping and mining program to make possible for that year a production of 500,000 tons of phosphate rock.

Total production to date has been 786,000 tons. To uncover this amount of phosphate rock, it was necessary to remove 900,000 yd. of topsoil, 155,000 yd. limestone cap rock, and 1,800,000 yd. shales. Stripping ratio of ore to waste was about 1:5.

Various methods of stripping have been tried and compared since start of operations, and time studies and efficiency records have been kept on each piece of equipment used. The tests conducted during the last three years have resulted in assigning a particular piece of equipment to a particular job. Bulldozers and scrapers are used to remove topsoil. Maximum economic haul is 300 ft. and 500 ft., respectively. Phosphate shales are removed by 2½-yd. shovels and trucks. Because of its size, mobility, loading speed and capacity, the shovel is particularly adaptable to the pit operations carried on. Smaller shovels, ¾ yd. to 1½ yd., have proven to be better adapted to

[1] A general description of the Fort Hall operations appeared in E&MJ, July, 1949, pp. 131-132. Additional geologic and operating details are presented here.

[2] Mansfield, C. R. U. S. G. S., Bulletin 713, 1920.



GENERAL SEQUENCE of lower Phosphoria member, bottom to top, includes (1) the 6-ft. oolitic "main bed" of phosphate, (2) 2 to 4 ft. of lime rock called "cap rock," (3) a fairly constant 25-ft. thickness of phosphatic shales, (4) 2 to 4 ft. of limestone called "false cap rock," and (5) about 35 ft. of alternating phosphatic shales and limestone. Notice falt in structure.

Complex Stripping Problem

mining the high-grade rock. This is primarily due to the selectivity with which the operator controls the smaller units, and hence results in a much cleaner product.

Large-scale sampling and mining experiments on the phosphatic shale beds have shown that these beds vary considerably in vertical range in the geologic column, but several beds of considerable thickness have a P_2O_5 content that makes them suitable for electric furnace feed. As a result, all phosphatic shale members overlying the main bed are mined selectively under close supervision, guided by a sampling program calling for sampling of the different beds from the time they are first cored, in the drilling, until they have been mined and stockpiled. The Westvaco Chemical Division of the Food Machinery and Chemical Corporation is constructing a 13,000-kw. electric furnace for the production of elemental phosphorous west of Pocatello. Phosphatic shales for the furnace feed will be obtained from the Fort Hall mine. Until the furnace is placed in operation some time this summer, all shales mined and earmarked for the furnace are stockpiled in convenient areas near the mining pits and daily records are kept covering tonnage and P_2O_5 content.

The nature of selective strip mining in a flat-bedded sedimentary deposit requires benching. The height and area of each bench are determined by assay boundaries. Although appearing in a haphazard array, the resulting benches do have a continuity which is recognized when the whole geologic picture is known. It is the physical and chemical lensing of individual shale beds which controls the P_2O_5 content, and hence various boundaries and levels. All shales which fail to contain the proper P_2O_5 for the furnace are piled conveniently and separately as a unit, while all topsoil, limestone and siltstones of very low P_2O_5 content are stowed and kept separate as another unit. Once the topsoil, shales, and limestone are removed, the high-grade bed is ready for mining.

Dilution a Problem

As it is necessary to deliver to the company's fertilizer processing plant at Pocatello a rock containing a minimum of 31.5% P_2O_5, and as the rock in place contains from 31.5 to 33.5% P_2O_5, great care and precaution against dilution must be exercised during its removal by power shovel. After removal of the overlying limestone cap rock, the bed is cleaned very lightly by a dozer, with the most experienced men being used on this operation. The actual removal and loading of the rock by shovel is fairly simple as the footwall of the bed is designated by an abrupt change of color. The bed proper is black to dark gray, and the footwall a red-brown siltstone. However, there is a problem of small "operational faults" which requires the skill of an experienced operator. These faults have throws of from 1 to 6 or 7 ft., and are usually not evident in diamond drill hole cross-sections. They are later picked up during mining operations.

The main bed is soft and friable and is shoveled directly into pit trucks and hauled to the railroad for loading into cars. Although the equipment now in operation at the mine is the most suitable for selective mining of the lower phosphatic beds and the requirement for flexibility, future mining will entail greater depths of overburden. A large proportion of this future overburden will not be amenable to selective strip mining but will be removed as units up to 75 ft. deep. These large yardages of waste material low in P_2O_5 content necessitate overburden removal at low cost. Comparison studies are now being made on the larger types of earth-moving equipment.

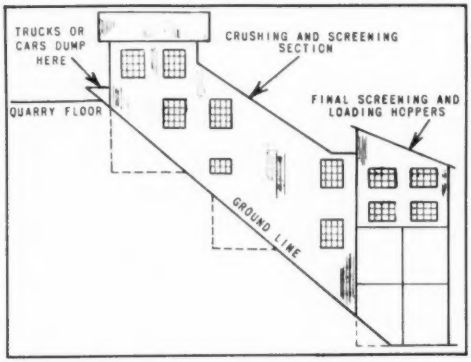


FIG. 1. STEEP GROUNDLINE enables feeding from quarry floor or mine track, holds conveyors and elevators to a minimum. Cost of materials handling is lowest possible in this type of plant.

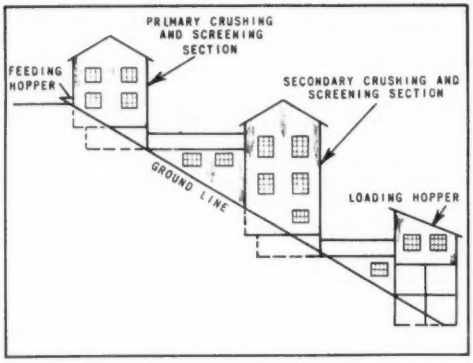


FIG. 2. SEMI-GRAVITY PLANT needs conveyors, either level or inclined, to connect successive operations. Building conveyors may be cheaper than excavating in hard rock to get gravity flow.

Crushing Plant Design – Part I

L. M. ANDERSEN[1]
Milwaukee, Wis.

LAYOUT DESIGNS of such diverse installations as rock crushing and portland cement plants as well as plants for the reduction of ores have many common factors.

Based on many years of design experience, typical arrangements of such units are discussed and analyzed here, with variations to suit individual requirements. Sketches of a general nature illustrate these arrangements, with principal plant operations, such as crushing, screening, etc., segregated.

The nature of the plant site determines to a large extent the most suitable type of crusher installation. In many cases sloping ground is preferable to a level plant site to obtain simplification of material handling. Figs. 1-5 inclusive illustrate the factors involved in adapting the crushing plant to its site.

The feed hopper for primary crushers is easily built in the form of a box as illustrated in Figures 6, 7, 8, and 9. The material may be allowed to pile up in corners of the box to its natural angle of repose, or hoppered sides may be provided in the box down which the material will slide into the crusher. The box or hopper is suitably constructed to receive material from a truck or car. In the case of a jaw crusher, removable sections of the hopper or stone box are provided to facilitate the removal and changing of crusher parts.

The hopper side feed box is usually used to handle large, blocky material or material that builds up easily on itself to form a high, unstable angle of repose; also when self-cleaning is required for any reason. When hoppered sides are used they must be lined to withstand abrasion.

Part II will appear in an early issue.

[1]Supervisor of Plant Layout, Crushing, Cement, and Mining Machinery Section, Basic Industries Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

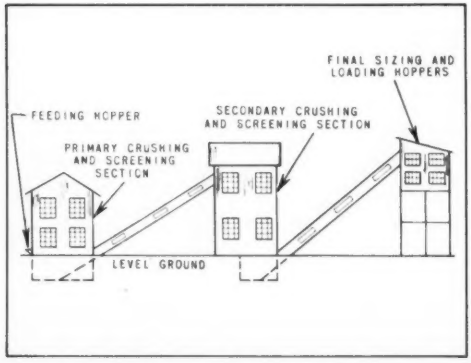


FIG. 3. FLAT COUNTRY calls for long conveyors or elevators to get material through the plant. This raises equipment and power costs, but holds excavation to a minimum.

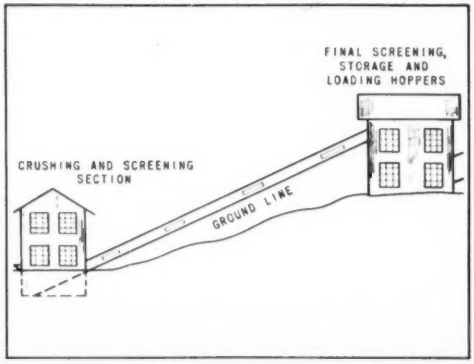


FIG. 4. UPHILL PLANT should be built only when unavoidable, for example, in quarries or open pit. Primary crusher may be moved out and down into pit to cut down haulage distance.

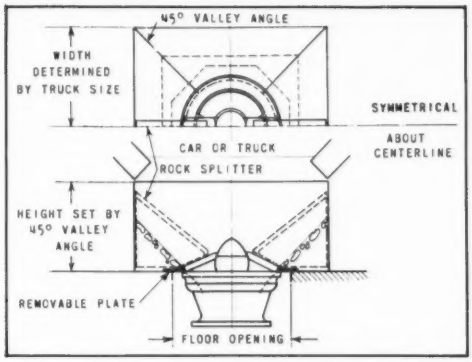


FIG. 6. FEED BOX for gyratory with dumping track on both sides. Requires larger building, but makes feeding easier. Note removable plates to give free access to bolts for crusher repair.

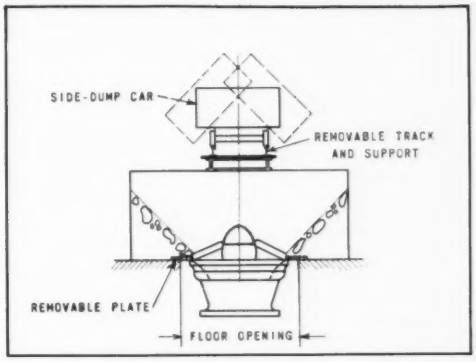


FIG. 7. CENTER-DUMP FEED calls for crane large enough to handle crusher, also to remove center track section. Building width is smaller. Floor opening in all these is of generous width.

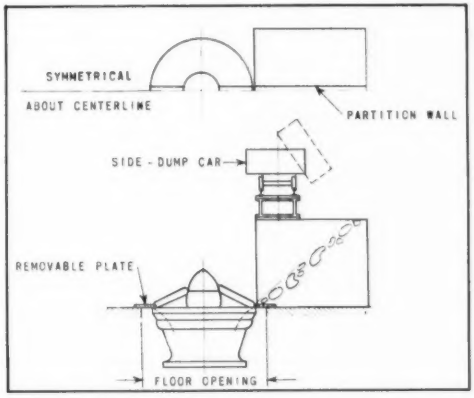


FIG. 8. REVERSE DUMP puts crusher into clear for easy servicing. Cars dump onto stone box, lined hopper, or heavy manganese-lined grizzley. Note center partition to protect crusher spider.

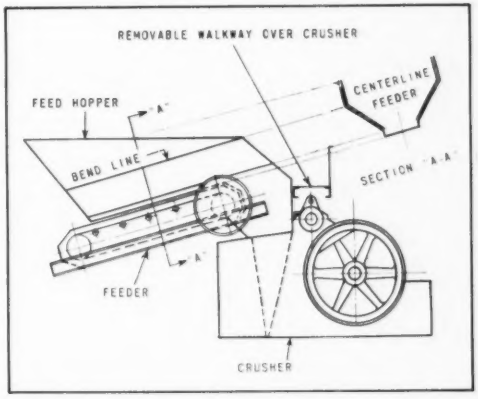


FIG. 9. BEND LINE of this hopper should run parallel with slope of pan feeder. It is easy to build because sides are not warped. Lining, usually with rail, is also easy.

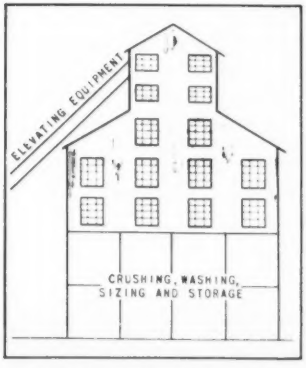


FIG. 5. GRAVITY PLANT can use skips or conveyors to carry material to top of plant. This is good for handling sticky ore.

When feeding a gyratory crusher by gravity from a truck or car it is advisable to rotate the crusher so that a spider arm is in a position where it will split the feed into both chambers of the crusher. In the case of heavy, blocky material, a removable splitter over the spider arm is recommended. By splitting the feed to each chamber over the spider arm the operator has better control over bridging in the crusher, thereby minimizing delays.

Referring to the pan feeder of Fig. 9, care should be taken that sufficient distance is allowed between the foot shaft of the pan feeder and the feed point of the hopper to permit the pans to close completely before receiving the material.

If possible, the feeder should be arranged so that any spillage can be spouted to the conveyor that handles the crusher discharge. If this cannot be done, ample room should be allowed below the feeder for maintenance and cleanup.

Generally, feeders 48 in. wide or less may be placed on a 15-deg. slope. It is well to keep the angle of inclination of larger feeders more than 48 in. wide at 10 deg. or less.

Fig. 10 shows various arrangements for properly feeding secondary crushers. Ample head room has been provided to completely fill the crushing chamber all around. By this procedure a resulting uniform wear is obtained, insuring a uniform adjustable crusher discharge opening. Methods of feeding screens appear in Figs. 11-15.

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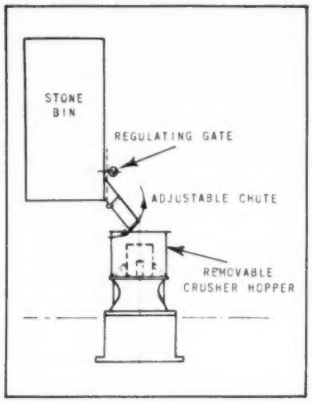
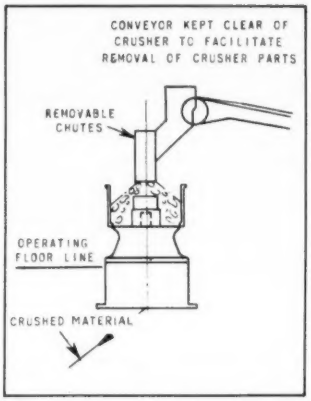



CONVEYOR KEPT CLEAR OF CRUSHER TO FACILITATE REMOVAL OF CRUSHER PARTS
REMOVABLE CHUTES
OPERATING FLOOR LINE
CRUSHED MATERIAL

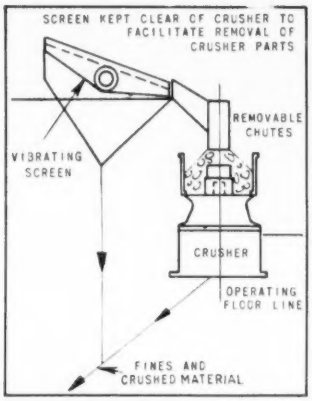


FIG. 10. SECONDARY CRUSHER feed installations should keep crusher hopper filled with rock to same level all around at all times.

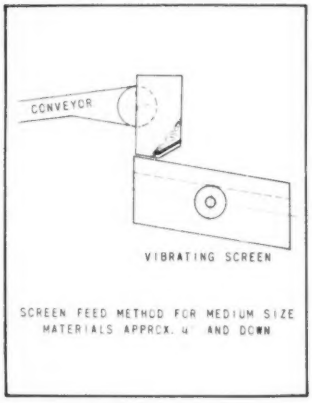


FIG. 11. FEED BOX over the screen absorbs the impact of the rock and spreads the material evenly.

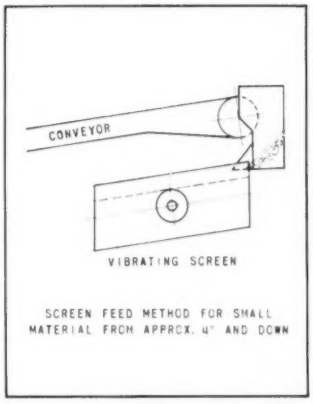


FIG. 12. REVERSED FLOW OF SCREEN FEED has been arranged here for closed circulating or final sizing screens.

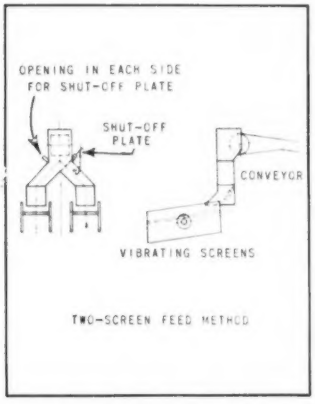


FIG. 13. SHUT-OFF GATES for by-passing feed if one screen must shut down. Gate hangs outside chutes when not in use.

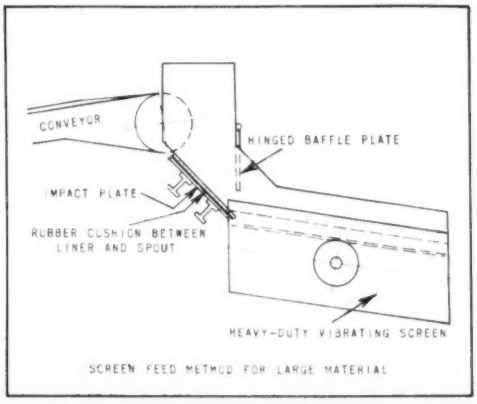


FIG. 14. SCALPING SCREEN for handling heavy blocky material is fed by means of a spout lined with abrasion-resistant liner that is backed with rubber.

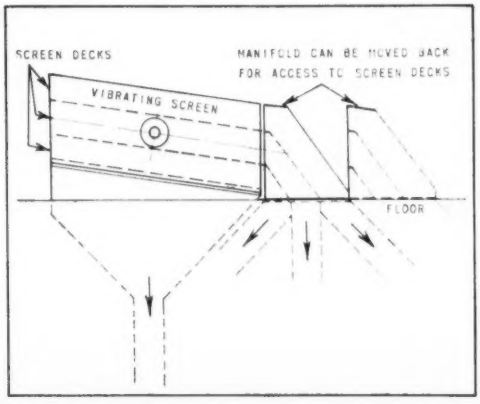


FIG. 15. MANIFOLD slides back to aid in removing screen sections on triple-deck screen. Gap between screen and chutes must be wide enough to allow for excess vibration when starting and stopping.

KEEPING TAB ON PRACTICE

DRILLING with a jackhammer set up on an air-operated jackleg. In this instance, detachable steel bits are being used.

Tungsten-Carbide Drilling vs. Diamond Drilling. How big is the number of mining companies, hitherto users of diamond drills for making blast holes, who are replacing these drills with rock drills employing sectionalized steel and carbide bits? To begin answering this question, we would first point out that surveys over the last 10 years have never disclosed more than about 50 companies at any one time who were using diamond drills for making blast holes, and that such use in almost all cases was for only part of the current production.

Recent inquiry among this group of operators discloses four companies (Howe Sound's Holden mine in Washington, O'okiep in Africa, Alan Wood in New Jersey, and Powell Rouyn in Quebec) who have converted completely from diamond drills to rock drills with sectionalized steel and carbide bits. Sherritt-Gordon, in Manitoba, and another Howe Sound subsidiary, namely, Britannia in British Columbia, are curtailing their diamond-drill work in favor of carbide drilling, and U. S. Vanadium at Bishop, Calif., is thinking about it. The last-named company, which used to drill radial holes from a central drift in stoping, expects to go to parallel drilling shortly, using the Cananea system.

Some 10 other companies who use diamond drills on blast-hole work are also working with long-hole carbide drilling, in the main experimentally.

The outstanding case of conversion to long-hole carbide drilling has been that of the Holden mine, the matter being only about a year old. The change-over has already been discussed (*E.&M.J.*, Feb., 1949, p. 99). More recent information, supplied by the management in mid-June, states that percussion drills and 2-in. carbide bits have completely replaced diamond drills for blast holes. Since experiments began in 1948, a total of 61,389 ft. has been drilled, using 577 bits for an average of 106.4 ft. per bit. Improved drilling technique and shop practice increased the average to 140.6 ft. per bit during the first five months of 1948, as 280 bits drilled a total of 39,357 ft. An average of 74.2 ft. per machine shift was attained in 1949 up to the same date. Results indicate that the cost per foot for percussion drill holes up to 70 ft. long is roughly one-third that of similar diamond-drill holes.

Reasons for this conversion from diamond drills to carbide bits include greater drilling speed and lower cost of labor obtained with the latter, and higher prices for industrial diamonds coupled possibly with poorer stones.

Length of holes also can be a factor in promoting such a change. National Tunnel and Mines, in Utah (now closed), held that diamond drilling paid only for blast holes 70-100 ft. long. They believed that up to 40 ft., power-feed drifters with coupled steel were cheaper.

Length of hole is apparently proving itself a factor at some of the African copper properties. At Mufulira, in Northern Rhodesia, carbide bits have been under test for medium-length holes for crown and rib pillar destruction. The opinion is expressed that they may displace diamond drilling for holes 40 to 60 ft. long. At Rhokana Corporation's NKana mine carbide bits have been tried but the management said recently, in a letter, that their use had not progressed to the point where it is replacing blast-hole diamond drilling. Many holes are too long to be undertaken with them (and the jointed steel). Experiments on shorter holes at NKana, though indicating that tungsten carbide may be a better proposition than diamond drilling, are not yet conclusive.

Blast-hole diamond drilling still retains favor at NKana as in many other places. At NKana, this type of drilling developed from a means of pillar recovery to a stoping method in the four-year period 1944-1947. The practice during this period is discussed in a 60-page paper in the Chemical, Mining & Metallurgical Society's *Journal* (Johannesburg) for last October. The writer, O. B. Bennett, manager, predicted then that diamond drilling would be providing most of the stoping tonnage within the "next year or so" and would be giving still better costs.

Roan Antelope also, which has done much blast-hole diamond drilling, plans no curtailment of its program. Over a two-year period it has been steadily lowering its cost per foot diamond-drilled. Its practice also was described recently in detail in the *Bulletin* of the Institution of Mining and Metallurgy, London.

At Warner Co.'s limestone mine, in Pennsylvania, blast-hole diamond drilling is still regarded as experimental, though eight machines are in service. Increased operator experience plus better bits, it is claimed are getting longer diamond-bit life. This now averages over 3,000 ft. per bit. One bit has drilled over 11,000 ft.

Tennessee Copper has increased the diamond-drill footage it obtains per bit by 50% since last November. It is now 150 to 200 ft.

At Noranda, in Quebec, where the Noranda system originated diamond-drilling blast holes from a drift radially in a vertical plane), open-stoping is changing to pillar mining. This restricts the amount of long-hole work, with little incentive to change to percussion drilling with carbide bits.

Canadian Refractories, Ltd., Kilmar, Que., is still using the diamond drill for all primary breaking in open stopes, although the breaking cost has been increased by higher bit cost. The drilling is either in vertical rings from subdrifts, horizontal rings from inclined raises, or flat breasting in shrinkage stopes. W. T. Bray, mine manager, says carbide bits have not been tried for long holes, because their ground breaks up badly and the resulting roughness of the hole wall would make loading very difficult, if carbide bits were used instead of diamond drills. With the latter, the caving that takes place around small slips is usually mudded up with cuttings, and the hole can be loaded past the slips, provided it is not washed or blown out too vigorously.

Shaped-Charge Tests Taper Off. As Consolidated Coppermines, at Kimberly, Nev., was shutting down its underground mine at the end of June, Frank J. Bezzic, general mine foreman, gave the last word on the tests with shaped charges that had been under way there. During the early stages of experimenting they had started out with the Monroe theory, using a long slender charge on standoff legs 1 to 8 in. long and an inverted cone of a pitch varying up to 65 deg., also using a cone of the same pitch on top. After trying various sizes under various conditions, they concluded they were not getting the effect wanted. Their objective was to get the most shattering effect possible for secondary blasting, and to bring down the muck at draw-points that were hung up too dangerously to drill.

After many trials, they standardized on two sizes: a 4x4-in. charge with a 22½-deg. inverted cone bottom and flat top and no standoff legs for boulders up to 5 or 6 tons in size, and a 6x6-in. charge with a 22½-deg. inverted cone bottom for boulders up to 20 tons, also with no standoff legs. Excellent results were obtained in all cases where the charge could be placed where it could really take effect.

WASHINGTON REFLECTIONS

McGraw-Hill Washington News Bureau

Interior And Treasury To Exchange Ideas On Small Mine Operator's Tax Problems

PAUL LEACH, JR.

The mining industry should watch with considerable interest the development of talks between the Interior and Treasury Departments concerning possible changes in the income tax structure as a device to stimulate exploration and small enterprise in the critical minerals field.

The talks have just started, only a few meetings have been held so far, and these merely to establish an understanding of the problem. The next few months will bring forth the real meat of the discussions.

Already, however, there is apparent agreement between the two groups on basic facts. Both Treasury and Interior accept these fundamentals:

1. The domestic reserve situation is not precarious, yet, but there is insufficient knowledge of supply and demand to enable definition of our coming problem in reserves of critical minerals.

2. Exploration for new sources of these minerals is languishing.

3. "Stockpiling in the ground" is not a solution to depleted resources.

Is revitalization of exploration an effective remedy to the depletion problem? Both parties agree that it is. It is realized that technologic research should complement, not displace or replace, exploration.

Both Interior and Treasury believe there are vast latent and potential ore deposits, somewhere, but they don't know for sure. The answer to our relative degree of self-sufficiency still hangs upon the factual determination of reserves.

Exploration, then, is the one way we can find out now what we have; the one way to make any corrections in our estimates of how much we, now and in the future, will have to import in order to balance supply and demand, and to back up our industrial-military defense.

Small Miners Stymied

Effective exploration depends, however, upon the participation of many little fellows, who are willing to take a calculated risk to find something of value. But today's economic climate offers little financial inducement for small enterprisers to engage in the mining business.

Here is the crux of the problem.

The little operator has to watch his nickels, he has little on which to write off losses. The big operator, on the other hand, has a larger depletion allowance, and can write off exploration and the like as costs or losses against taxes on other revenue. His capital foundation will allow some losses, they can be absorbed in the long run.

The "little guy" has neither plenty of money, nor time to write off his losses. His "hand to mouth" financial setup will not allow losses—he can't soften the blow with depletion allowances when he has little to deplete; and he can't write off a loss against other revenue when he hasn't any other revenue.

With all this understood, the immediate reaction is "OK, help the small enterpriser, give him a selective advantage, taxwise, in attracting and utilizing 'risk capital'." Immediate retort by the tax expert is "just how does that selective device work?" The device is yet to be developed. This is the thing the Interior-Treasury talks are most likely to bring into being.

Recoupment of capital investment, of course, is the answer to risk in mining ventures, but there are problems here among the complexities of our tax structures. South Africa has a plant whereby the small businessman is given help through longer periods, taxwise, to carry over losses. But, the South Africans do not have a percentage depletion allowance as does the U. S., so that plan can't be used.

Canada Helps Miners

Canada, to the investor, offers the mining venture the best break of all the business investment opportunities. First, there is a 33⅓ percent depletion allowance, applied to net profits. Second, share holders of a mine are allowed an additional depletion allowance, tax free, of 20 percent of their dividends from the property. The new Canadian income tax law passed in 1947, gives new mines a special tax, and for the first three years of production a fifty-percent cut on that tax. There are, in addition, special tax allowances for exploration, based upon prospecting expenses. Add to all this the fact that Canada has no capital gains tax.

What does the U. S. offer? The only thing that can compare to Canadian tax aid is the 15 percent depletion allowance applied to gross revenue, with a ceiling of 50 percent of the net.

This may be more favorable than the Canadian allowance, but the help stops here. While the Canadians have allowances for stockholders, new mine tax waivers, exploration allowances and no capital gains tax, we must get along on just the one special tax exemption.

The "carry-forward" and "carry-back" of losses technique is one method of helping out in the employment of risk capital. But, one problem confronting the tax people is the mere definition of the point at which a property ceases to be an exploration project and becomes a development.

Cost of Development

Tied up here is the problem of treatment of expenses incurred in exploration and development. If the project is successful the expensing can be dealt with. But, what if the project fails. Many small enterprisers have just the one egg in the basket—and there is no way of charging the loss against other sources of income. You can't subtract from zero.

Double taxation, capital gains and other restrictive taxes are a problem—Treasury is the first to admit it. So far, however, they haven't found an answer.

The administration is showing a lot of interest in the businessman's troubles these days—an election is coming up. While the Interior-Treasury Department meetings are going on quietly and are devoid of politics, there are other, more political, hearings going on. They are important too.

For instance, Secretary of Commerce Charles Sawyer has been touring the country for a couple of months, listening to the suggestions of businessmen on how to keep business on its feet—and growing.

Sawyer most often hears this kind of thing:

Cut back excise taxes to pre-war levels.

Shorten the base period for tax depreciation of machinery and equipment.

Guarantee loans to small business—a la FHA.

These suggestions apply to mining just as much as they do to other industry. Knowledge of both the political and behind-the-scenes administration efforts to do something about business problems should be sufficient to motivate some serious "thinking out loud" by the mining industry.

These pages will continue to report on progress of both projects. Particular emphasis will be paid to the Interior-Treasury talks, however, because they, from all appearances, offer the most promise to mining.

Mine Subsidy Legislation – An Editorial

AS THIS IS BEING WRITTEN, it appears that the O'Mahoney Bill (S. 2105) has small chance of being acted upon by Congress in the rush for adjournment. We hope, indeed, that this bill, which would give some metal mines a peacetime Government subsidy, will fail of enactment, because, as it stands, we believe it to be inimical to the best interests both of the mining industry and the nation.

To begin with, we have approached consideration of subsidy legislation from the firm ground of our belief in the American system of free enterprise. As we have said before (April, 1949) in the face of the present world-wide drift toward statism, it may be necessary to modify traditional American concepts of government and economics in order to preserve our basic freedoms. It would be tragic, however, to let ourselves be frightened into discarding these concepts altogether.

Government subsidization is obviously the antithesis, and the murderer, of private enterprise. On what grounds, then, could the mining industry believe in the one and also accept the doubtful aid of the other?

The answer is clear enough. Only on the basis that the public interest demands it can industry subsidies be defended. It is on this basis alone that airlines, steamship lines, railroads, the farmers, and other groups have at various times been subsidized.

It is equally clear that the public interest demands an adequate and continuing supply of mineral raw materials, preferably from domestic sources. Private industry has done, and is continuing to do, a splendid job in this respect.

However, there are two areas in mining that private industry can not enter. One is the region of long-shot exploration for ore deposits, where the odds against discovery outweigh the probable rewards.

Private industry cannot afford much of this sort of risk-taking; yet there is a very definite need for it. The San Manuel copper orebody shows that Government can help do the job without becoming involved in the mining business.

The other closed area is the marginal mining property where: 1, decreasing grade, increasing depth, or other factors have choked off profitable mining; 2, yet the district or the mine still hold substantial reserves of metals that may be permanently lost to industry if the continuity of mining them is broken.

In these areas, and in these areas alone, Government support of mining may be justified under today's conditions. The O'Mahoney Bill was written to provide for this sort of Government activity, both in exploration and in support of marginal mines or districts. The bill had the approval of the Administration and of the Interior Department.

For our part, we approved of the spirit of the bill, although we had misgivings on several features of it. For example: we doubted, and still doubt, the wisdom of giving such broad spending authority for subsidies to the Interior Department, which still harbors many outspoken advocates of the welfare state. Also, the bill, under its most recent proposed amendments, sets up a potential threat in the special stockpile of metals.

In brief, S. 2105 was hastily written, and it left too much to the imaginations of its proposed administrators. But it did represent an attack on an industry problem that has to be solved sooner or later.

However, when the bill went through committee, it picked up amendments that, among other things, made it mandatory for the Government to pay half the exploration and development costs of any likely prospect or any mine that produced less than 100 tons a month of combined copper, lead, and zinc. These payments were to be handed out merely on application, with only the simplest kind of prior investigation.

The intent of these amendments was to help the small miner, an objective with which we are in complete sympathy. But the effect would have been to make possible a liberal dipping into the taxpayers' pockets that could hardly be justified as an act in the national interest.

We are informed that in a last-minute effort to secure passage, Senator O'Mahoney will offer new amendments, if S. 2105 reaches debate, that will require more thorough investigation of applicants for subsidies. Other features of the bill were to be modified as well.

Despite these changes, however, S. 2105 still offers a threat, rather than a benefit, to mining. It is a hastily and loosely contrived piece of legislation. It lacks the support of even all of the industry elements who would receive its subsidies. And its justification as in the national interest is doubtful, where no doubt should exist.

We look much more hopefully toward action on tax problems, such as outlined on the opposite page, or to a revival of the RFC mine development loan, as solutions to the problems of the small miner.

We would welcome, and we will assist, further efforts to bring to the mining industry Governmental aid in these channels, or in the areas defined earlier in this editorial. But we can not support an effort that we sincerely believe would in the end bring mining's house down upon its own head.

MARKETS—Trends and Prices *(Continued from page 69)*

United States Slab Zinc Statistics

(American Zinc Institute)

In Tons

	Production	Shipments—Domestic	Shipments—Export	Shipments—Gov't Acc't	Shipments—Total	Stock at End	Unfilled Orders
1943	971,873	831,430	56,208	.....	887,638	173,510	44,914
1944	901,332	830,334	6,988	.....	837,322	237,520	21,332
1945	799,520	762,925	9,422	5,302	777,649	259,391	27,092
1946	759,346	714,292	66,638	62,007	842,937	175,800	58,057
1947	848,027	698,281	117,305	140,230	955,816	68,011	59,705
1948	850,105	770,396	69,910	57,598	897,904	20,848	51,318
1949:							
January	75,815	62,614	5,857	7,763	76,234	20,429	75,858
February	69,193	60,827	3,497	4,198	68,522	21,100	87,898
March	78,121	51,381	7,460	12,176	71,017	28,204	79,722
April	75,921	35,948	8,438	8,757	53,143	50,982	65,713
May	77,537	35,564	5,731	11,394	52,689	75,830	58,644
June	73,989	44,820	14,055	8,025	66,900	82,919	42,705
July	74,569	62,443	3,111	6,526	72,080	85,408	53,423
August	73,819	68,659	1,212	4,468	74,339	84,888	41,336

Note: Commencing with January, 1948, all regularly operating United States primary and secondary smelters are included in the report; production from foreign ores is included for the entire period.

Official London Prices

Since Dec. 18, 1939, the British Ministry of Supply has named maximum delivered prices for the major nonferrous metals. Delivered prices were advanced sharply in September because of devaluation of the pound as follows:

	Per Long Ton £	s	d
COPPER:			
Electrolytic, high conductivity	140	0	0
Fire refined, high conductivity	140	0	0
Fire refined, high grade	139	10	0
Fire refined, min. 99.7 percent	139	0	0
Fire refined, min. 99.2 percent	138	10	0
Hot rolled black wire rods	149	15	0
LEAD:			
Soft, foreign, duty paid	122	0	0
Soft, Empire	122	0	0
English, refined	123	10	0
ZINC:			
Foreign (G.o.b.) duty paid	87	10	0
Domestic (G.o.b.)	87	10	0
Prime Western and debased	87	10	0
Refined and electrolytic	88	5	0
Minimum 99.99 percent	89	15	0
TIN:			
Ingot, 99 percent	750	0	0

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

(September 30, 1949)

Aluminum, ingot, 99 plus percent, lb. (base price)	17c.
Antimony, spot, lb., 5 tons and up but less than carload, in cases	41.78c.
Bismuth, ton lots, lb.	$2.00
Cadmium, commercial sticks, delivered, lb.	$2.00
Calcium, lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.07
Cobalt, 97 to 99 percent, per lb.	$1.80
Indium, troy oz.	$2.25
Nickel, cathodes, lb., f.o.b. Port Colborne (a)	40c.
Magnesium, 99.8 percent, carloads, lb., producer's plant	20½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots), troy oz.	$69.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$75.00
Selenium, 99.5 percent, lb.	$2.00
Silicon, minimum 97 percent, spot, carloads, lb.	16.50c.
Tellurium, lb.	$1.75 nom.
Thallium, 100 lb. or more, lb.	$15.00
Titanium, 96 to 98 percent, lb.	$5.00

(a) Includes U. S. duty

METALLIC ORES

Beryllium Ore, 10 to 12% BeO, per unit	$25.00@$35.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry	
48% Cr_2O_3, 2.8 to 1 ratio	$34.00@$35.00
48% Cr_2O_3, 3 to 1 ratio	$38.00@$40.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$7.60
Mesabi bessemer	$7.35
Old Range non-bessemer	$7.45
Mesabi, non-bessemer	$7.20
Lead (Galena), 80 percent, Joplin, Mo., ton	$192.67
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese subject to premiums and penalties, 80c. to 81c., c.i.f. U. S. ports. Quoted prices largely nominal.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	54c.
Tantalite, 60% concentrate, per lb.	$2.00@$2.75
Tungsten Ore, per unit of WO_3	
Foreign, 60 percent, duty paid (a)	$18.00@$20.00
Domestic, scheelite, 60 percent and upward	$28.50
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 40 percent concentrate, Joplin, Mo., per ton	$57.00

(a) Nominal

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl. carload lots, delivered	6c.
Cobalt Oxide, 70 to 71 percent, lb., ceramic grade	$1.38@$1.40½
Copper Sulphate, 100 lb.	$7.00

ALLOYS

Beryllium Copper, 4 percent Be, per lb. of contained Be	$24.50
Ferrochrome, 65 to 69 percent, per lb. of Cr contained	18.60c.
Ferromanganese, 78 to 82 percent, gross ton, seaboard	$172.00
Ferromolybdenum, 55 to 65 percent Mo, lb. of Mo, contained	$1.10
Ferrosilicon, 50 percent, per lb. of contained Si	11.3c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$2.25
Ferrovanadium, per lb. of V delivered	$2.90
Silicomanganese, 1½ percent C, per lb. contracts	8.6c.
Spiegeleisen, per long ton, 19@21%	$65.00

NON-METALLIC MINERALS

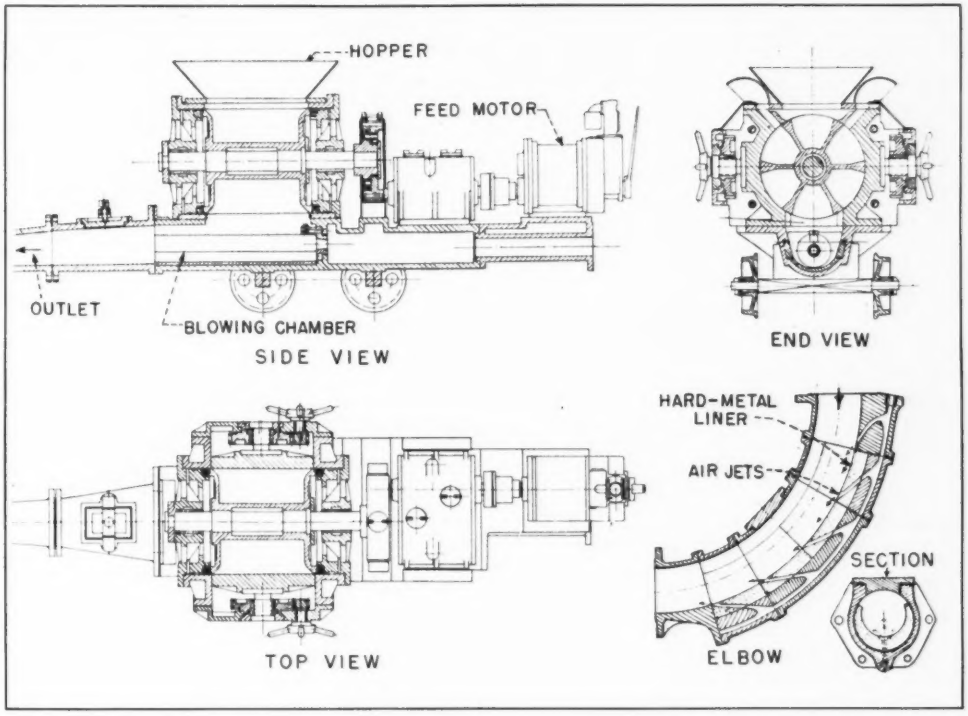
Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$960@$1,050
Crude No. 2	$492@$550
Spinning fibers	$232@$475
Shingle fibers	$95.50@$141
Paper stock	$78.50@$88
Waste	$58
Shorts	$27@$52
Vermont, f.o.b. Hyde Park:	
Shingle stock	$97.00@$107.00
Paper stock	$68.50@$85.00
Waste	$51.00
Refuse or shorts	$25.50@$46.50
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$11.50@$12.00
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$9.00@$9.50
Bauxite, long ton:	
Domestic, crude, 50 to 52 percent (not dried)	$4.00@$5.00
Domestic, chemical, 55 to 58 percent (a)	$8.50@$9.50
Domestic, abrasive, 80 to 84 percent	$18.00@$18.50
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, airfloated bulk	$8.50@$9.50
North Carolina, ceramic grade	$18.00@$20.00
Feldspar, bulk ton:	
Potash or soda feldspar, 200 mesh	$18.50
Glass spar, white, 20 mesh	$11.75@$12.50
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois, 70 percent, all rail movement, ton	$37.00
Acid 97% concentrate, bulk, ton	$43.50
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$30.50@$31.00
Mica—Domestic f.o.b. mines. Punch, 12 to 22c. per lb. according to size and quality. Sheet, clear, 1½ x 2 inch, 70 to 75c.; 2 x 2 inch, $1.10 to $1.20; 2 x 3 inch, $1.40@$1.50; 3 x 3 inch, $1.70@$1.80; 3 x 4 inch, $2.10; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $135@$165 per ton. Bulk sales, dry ground, $40@$80 per ton. Scrap, $21 and up.	
Ocher, Georgia, ton, in sacks	$24.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	(a)12@14c.
Sulphur, Texas, mines, long ton	$18.00
Talc, f.o.b. works, ton:	
New York, purified	$18.50@$20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50

(a) Nominal

IRON AND STEEL

Pig iron, gross ton, basic, Valley furnaces	$46.00
Steel, f.o.b., Pittsburgh billets, net ton	$52.00
Structural shapes, 100 lb.	$3.25

OPERATING IDEAS



Compressed-Air Unit for Back-filling Stopes

Details on the pneumatic stowing system employed at the Grund mine in the Harz mining area of Germany illustrated and reported here were revealed in reports submitted by the British Intelligence service based on observations made after World War II.* The equipment sketched above was used to carry backfill into stopes and resembles to some extent the units used to backfill stopes hydraulically. Chief advantage of the system shown here is the ability of the machine to handle material up to 2 to 3 in. in size, and to pack waste right up to the roof of a stope. Chief disadvantage is the requirement for large amounts of compressed air to operate a blower. The unit shown above required about 2,480 cu. ft. of free air per min. to operate. It was claimed that one blower could handle up to 30 tons per hr. to a distance of 100 m.

Compressed air at the Grund mine was comparatively cheap because it was produced by hydraulic compressors. However, a similar pneumatic stowing system was used at the Rammelsburg mine in the Harz area which did not have hydraulic compressors. The mining method at Rammelsburg did not require the same close packing necessary at the Grund mine.

As shown, the stowing unit is mounted on mine car wheels. Fill enters the blower through a hopper and is fed into an underlying pneumatic chamber by rotating vanes which serve to transfer the fill and at the same time seal off the compressed air in the pneumatic chamber as the fill enters. From here the waste material is blown through a system of flanged pipes and fittings into the stopes. Operators reported that angular particles of rocks such as sandstones were easier to transmit through the pipe systems than flat types such as slates.

Transverse and longitudinal section of an elbow are shown. Several unique abrasion-resistant features in the design are obvious. Note, for instance, that a hard-metal liner is installed on the outside sweep of the elbow where abrasion would naturally be the greatest. In addition, compressed air is injected into the elbow through a series of tangential jets which boost the material along and form a partial cushion which minimizes the abrasion.

Telescopic sections of feeder pipe were also provided which enable operators to extend or retract pipes during filling operations.

*British Intelligence Objectives Sub-Committee Final Report No. 654.

FIG. 1. PROPERLY SPACED rail is prepared for welding by beveling surfaces before or after spotting rail.

FIG. 2. STEEL PLATE is first welded to adjacent flanges. Then both sides of rail web and finally, the ball are welded.

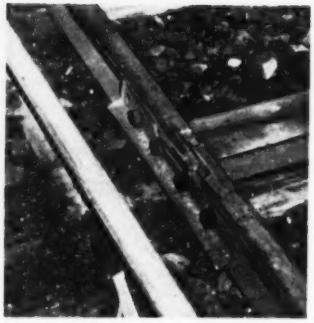


FIG. 3. EXPANSION JOINT for outdoor installations can be easily prepared with oxy-acetylene cutting blowpipe.

Welded Rails May Mean Better Haulage

Electrical resistance of mine rails can be reduced to a practical minimum when they are bronze-welded. Standard practice has been to bond all bolted joints with one or more copper bonds. However, independent engineering studies made on relative resistance of various types of joints have shown maximum conduction through bronze-welded joints as compared to copper bonds.

Advantages

Bronze-welding of rail joints has other important advantages:

(1) Bronze-welded track provides smoother rolling action for locomotives and cars. Vibration and spillage are reduced. There is less wear and tear on axles, motor housings, mine car wheels, and bearings.

(2) Trouble from low or loose joints, associated with standard bolted connections, are eliminated.

(3) Track maintenance is reduced because there are no angle bar bolts or copper bonds to be replaced. Less over-all track maintenance is needed because welded track is more rigid and requires less resurfacing.

(4) Bronze-welded track permits safer and faster main-line haulage. In some cases main-line haulage has been increased 50% with fewer accidents occurring.

(5) Cost of bronze-welded track is low. Its many advantages, therefore, can be obtained at a cost comparable to that for angle bars, bolts, and labor required for conventional bolted track.

Equipment required for the bronze-welding of mine rails, following the procedure developed by The Linde Air Products Co., is simple and inexpensive. All that is needed is an oxy-acetylene welding and cutting outfit, suitable bronze-welding rod and flux, and steel plates. The portable outfit is taken to the immediate location at which the joint is to be welded. Bronze-welding is performed during periods when the track is out of service. Under normal operating conditions eight to ten joints can be welded during an eight-hour day by a welding operator and a helper.

About $\frac{1}{8}$ in. between rail ends is ideal spacing. A $\frac{1}{4}$-in. steel plate approximately $\frac{1}{2}$ in. wider than the flange of the rail and approximately 8 in. long is placed under the joint. Plate and rail surfaces in the weld area should be free of all loose scale and dirt prior to welding. Good alignment can be maintained between the rail ends by suitable clamps.

Rail ends are prepared for welding by beveling with a cutting blowpipe to form a $22\frac{1}{2}$-deg. bevel on each rail. This beveling can be done either before or after the rail has been placed in position. The rails are then properly aligned, leveled, and the track ballasted in permanent position. The $\frac{1}{4}$-in. steel plate placed directly under the joint of the rail serves two purposes: (1) to increase the strength of the weld; (2) to serve as a back up for starting the weld when the rail ends are spaced too far apart. When old track is bronze-welded, wide spacing is quite often encountered.

A joint that has been properly prepared for welding by beveling with an oxy-acetylene cutting blowpipe is illustrated in Fig. 1. The vee at the intersection of the web and flange has been made wider to permit bonding with the $\frac{1}{4}$-in. steel back-up plate.

A partially-welded joint is shown in Fig. 2. The $\frac{1}{4}$-in. plate was first bronze-welded to the flange of the rail. The two adjacent rail flanges were then welded. The weld is continued up the web to the root of the ball and the procedure repeated on the reverse side of the rail. Upon completion of this welding the ball of the joint is bronze-welded.

Welding Done Underground

The majority of this type of welding has been performed on underground track exposed to uniform temperature the year around, thus eliminating problems of track expansion or contraction. However, for outside welded track, allowance for expansion and contraction with temperature changes must be made. Fig. 3 shows a typical expansion joint designed to overcome this problem. This joint can be easily prepared with an oxy-acetylene cutting blowpipe. Normal spacing for these outside expansion joints is one every 300 to 400 ft., depending upon track curvature and maximum temperature variations in the locality.

Since 1938 approximately 60 miles of bronze-welded mine track, ranging in weight from 40 to 90 lb., have been in daily service. After ten years there is still no indication of failure.

MUDDLING in High Places

It is time for men in Washington and London to stop toying with the problem of international trade. We of the democratic West are at a turning point in our economic affairs. A false step by either the United States or Britain could lead quickly to disintegration of trading between the people of the world as we have known it for the past hundred years. Recent meetings of diplomats in London and Washington have not lifted us out of this danger.

By two simple tests you and I can measure the sincerity of the men in Washington and in London who are trying to solve what they call "the dollar crisis."

One test applies to the British: Is Britain making an honest effort to re-establish itself as a real competitor in world markets?

The other test applies to us in the United States: Are we willing to see Britain re-emerge as a strong competitor in world markets—even in our own home market—and to help her do so?

Today, even though both countries have faced the devaluation test, the answer to these questions probably is no.

I

The situation we face is, in fact, unprecedented. In every important industrial country of the non-Communist world, except Germany and Japan, production is above prewar volume, thanks largely to the Marshall Plan. Yet trade between nations is shackled as it has never been since the 18th century. And the shackles grow day by day. What is worse, two distinct trading areas—the dollar area and the sterling area—have grown up in the non-Communist world, and the gulf between them grows wider.

What kind of leadership have the United States and Britain had in the face of this crisis? President Truman late in August wisely checked the trans-Atlantic bickering over the dollar crisis. *But Mr. Truman showed no awareness of the basic question that the American people must soon decide: Is the United States able and willing to generate trade between nations, as Britain did in the 19th century?*

What have British leaders offered us? Foreign Secretary Bevin and Chancellor Cripps called their September visit to Washington "one of the most important missions in history." *But they did not tell the British people, and perhaps do not admit themselves, that their Labor government must change its internal and external policies if Britain is ever to earn its living in a competitive world.*

Admittedly, the problem Britain has faced since 1945 is a colossal one. But, in the face of its grave difficulties, what has Britain done? The working day was shortened. Welfare economics have run riot. High taxes have sapped incentives. Labor and capital have clung to their prewar psychology of cartels and featherbedding. Government controls and government trading have hamstrung private initiative. Nationalization schemes have injected politics into the struggle for industrial recovery.

Thus the policies of the Labor government have made Britain's adjustment to its new position in the world immensely more difficult. But Americans who attribute the danger of an international breakdown to British socialism greatly oversimplify the problem. Virtually every country in the world, socialist or not, faces the same dollar crisis that Britain faces.

continued on next page

We Americans must recognize that our economic strength unbalances world trade as does Britain's weakness. World War II increased America's superior power to produce goods. It also made the United States more self-sufficient. Thus, while the world demand for American goods has risen, our demand for foreign goods, except for basic raw materials, has not increased. Today we sell more to every major area of the world than we buy from it—and yet we wonder why there is a dollar crisis.

It is time for us to recognize that there are two fundamentally conflicting pressures at work in the United States. One is our desire for a big surplus of exports over imports. The other is our desire for a system of free-wheeling trade around the world. We can not have both unless we as taxpayers wish to subsidize our exports. Which do we want?

Curtis E. Calder, chairman of the International Relations Committee of the National Association of Manufacturers, says, "The battle of the foreign trade gap is essentially that of reconciling our urge to export our surpluses with a reluctance to accept imports in payment for them . . . The dilemma is an uncomfortable one to face."

II

Here, then, are the basic questions that confront men in Washington and London. Does Britain really want expanding world trade or a high-cost welfare state? Does the United States really want expanding world trade or a huge surplus of exports? So far politicians in Washington and especially in London have ducked these issues because they are political dynamite.

If the people of Britain decide they want to regain their position as a competitive trader in expanding world markets, here are specific objectives that men in London should set for themselves:

1. Lower government costs. The British Treasury has asked for cuts of 5% in 1950. But a cut nearer 15% will be necessary, even if that means fewer government subsidies and health services. Enterprise will never revive nor costs come down while taxes take 40% of the British national income, including roughly 60% of business profits.

2. Fewer government controls. Only by removing controls and allocations (except on a few necessities) can Britain begin to return to prices fixed by competition rather than by government fiat.

3. Stronger anti-monopoly legislation for both business and labor. Britain needs a concerted drive against all forms of restrictive, high-cost practices. This drive should put teeth in the anti-monopoly act and supplement it with legislation to end restrictions imposed by trade unions.

4. Less restrictive trading practices. Britain should retreat gradually from its international barter between governments if competition is ever to have free play in international trade.

Meanwhile, if we of the United States sincerely want multilateral world trade, men in Washington must face up to four problems and hammer out workable solutions:

1. Use of the International Monetary Fund to back a devalued pound. In time the Fund, in which we have the controlling voice, might be used to promote convertibility of pounds into dollars.

2. Help for Britain in meeting war-created external debts. This might mean support for London in getting a reduction of the war debts Britain owes India, Pakistan and Egypt, for example. To achieve such a debt reduction for Britain we might have to underwrite a part of a Southeast Asia recovery program.

3. Encouragement of American investments abroad. Such investments should be directed primarily into enterprises which will earn dollars, such as the development of new sources of raw materials, or which will raise productivity abroad.

4. Our own tariff barriers. Our attitude toward this critical issue will be the acid test of how deeply we believe in the merits of free world competition.

If we really want free, competitive trading between the people of the world, these issues must be met and resolved by leaders on both sides of the Atlantic. If we do not want to face these issues, then let us resign ourselves to a world walled off into three trading areas: the Communist bloc, the sterling area, and the dollar area. So far, Washington and London have muddled along, except in facing the devaluation problem. Clarity and courage are still needed.

President, McGraw-Hill Publishing Company, Inc.

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NEWS OF THE INDUSTRY

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E. T. STANNARD

Three Kennecott Executives Perish in Accident

Three top officials of Kennecott Copper Corp. were killed on Sept. 9 when a Quebec Airways plane exploded and crashed into a mountainside. The accident, in which all 23 persons aboard were killed, occurred in the rugged bush country on the north shore of the St. Lawrence River, 16 miles northeast of St. Joachim, Quebec. The executives of the Kennecott corporation who had planned to inspect titanium deposits at Havre St. Pierre, Que., were E. T. Stannard, president; Arthur D. Storke, former president of Climax Molybdenum Co., who was to succeed Mr. Stannard at the end of this year, and Russell J. Parker, vice president in charge of the company's iron and titanium div., and president of the Quebec Iron & Titanium Co.

E. Tappan Stannard was born Dec. 9, 1882, in Chittenango, N. Y. He graduated from the Sheffield Scientific School of Yale University and attended the Michigan School of Mines. He worked for the Federal Lead Co. in various parts of Missouri, and in 1911 was sent to Chile with a Kennecott subsidiary. Three years later he joined the parent company in Alaska, and was named general manager of the Alaska mines in 1918. He became general manager of the Alaska-Kennecott Corp. in 1920, with headquarters in Seattle. A few months later he was made a vice president and was transferred to New York in 1930. He had been president since 1933.

Arthur D. Storke, 55, was a native of Auburn, N. Y. At the age of 16 he went West to work as a gold miner at Cripple Creek, Colo. He later attended the University of Colorado and Leland Stanford University at Palo Alto, Calif. He joined Climax Molybdenum Corp. in 1917. In 1926 he went to South Africa as general superintendent for American Metal Co., Ltd., which holds stock in the Climax company. He became managing director of two Rhodesian mines partly owned by American Metal. In 1946 he became president of Climax Molybdenum Corp., which position he resigned last July 1 to join Kennecott. Mr. Storke was minerals adviser to Britain's Ministry of Supply during World War II and traveled extensively through Africa expediting wartime conditions.

SITE of plane crash

A native of Denver, Colo., Russell J. Parker, graduated from the Colorado School of Mines. For many years he was active in the diamond business in Africa, having been associated with the Belgian Diamond Co. He was later made assistant to the managing director of the Rhodesian Copper Co. in London. He is credited with discovery of the famous Roan Antelope mine. In 1942 he joined the Kennecott corporation as assistant to the president and a year ago was made vice president. Mr. Parker was 52 years old.

Two Companies Supply Stockpile Aluminum

Primary aluminum for the Government's stockpile program for the current fiscal year will be supplied by Reynolds Metals Co. and Permanente Metals Corp., according to the General Services Administration, Washington. The Munitions Board has indicated that it will purchase 60,000,000 pounds in this period, of which Reynolds is expected to supply 60% and Permanente 40%. The Aluminum Company of America said it had no comment on the action that apparently will exclude it from taking part in the stockpile program.

Both suppliers have acquired wartime aluminum production facilities from the Government and the sale of metal for the stockpile should assist them in meeting payments for the plants.

Early in the year the demand for aluminum was exceptionally heavy, and, in spite of a high rate of production, stocks in the hands of producers dropped to a low level. Along with other metals, demand for aluminum dropped off in the summer period and production out-distanced consumption.

Permanente, Kaiser-owned, recently contracted to buy three war surplus plants. It is understood that the company has the option to provide up to approximately 40% of all indicated stockpile purchases of aluminum for a number of years.

Gadget May Replace Geiger in Research

A new instrument, an alpha scintillation counter, which may replace the Geiger counter in certain phases of atomic research, has been developed at the U. of California at Los Angeles.

In the low rate counting problems encountered in some health physics and dust study applications, Geiger counters have not been entirely satisfactory, they explained. Long runs are needed to obtain statistically adequate numbers of counts in view of the background caused by cosmic radiation.

The new type of counter eliminates these obstacles, functioning more efficiently on low rate counting problems. Its greatest utility is in measuring very slight amounts of radioactivity in dust, soil samples. The basis of operation is the measurement of alpha particle scintillations by photomultiplier tubes.

The device is about the size of a table model radio and is entirely automatic once the radioactive sample to be measured is inserted.

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Split with CIO Looms as Mine-Mill Delegates Meet in Chicago; See Drop in Union Membership

Mine, Mill and Smelter Workers is heading for a break with CIO. This was evident to Engineering & Mining Journal's correspondent at the union's 45th convention at Chicago.

Mine-Mill will not pull out of the parent organization. Instead it will provoke possible expulsion by refusing to get into line behind CIO policies. That seems to be the strategy of this and other left-wing CIO unions in their feud with CIO leadership.

CIO will crack down on Mine-Mill and the other recalcitrant affiliates at the CIO convention opening in Cleveland Oct. 31. If Mine-Mill is kicked out of CIO, as most observers predict, employers dealing with this union are in for more of the same jurisdictional disruptions which have plagued parts of the industry over the past two years.

Mine-Mill delegates decided not to give up the union's fight for what it calls "autonomy." That is, the right to take a position contrary to CIO policy, as the union did in opposing President Truman's election, the Marshall Plan and the Atlantic Pact and in supporting the Communist-dominated World Federation of Trade Unions.

Mine-Mill leaders consider that the union is abiding by CIO policy when it takes independent action on these issues. It is the CIO, not Mine-Mill, which is abandoning the principle of union autonomy on which CIO was founded, they argue.

Evidence intended to support this contention fills a 58-page mimeographed booklet distributed to the 224 convention delegates.

A resolution adopted by the convention authorizes Mine-Mill's executive Board to "take whatever steps are necessary" to preserve the union's jurisdiction and right to self government.

Mine-Mill leaders stressed the need for preserving the union's autonomy within CIO and bringing to an end the raiding by CIO's auto, shipbuilding and chemical workers. Objective next year: regain some 20,000 members lost to these unions in Connecticut's "brass valley," Missouri's lead belt, and in the Utah and Alabama mines. To finance this comeback, per capita monthly tax will be increased from 80c to $1, with possible additional assessment later.

The union is in bad straits numerically as well as financially. A year ago, it made no secret of a claimed 108,000 members. This year no official membership figure is available. Union publicists use a round figure, 100,000. This is not backed up, however, by the voting strength of convention delegates, which represented only 53,000 members.

Assets reported were only $63,157, of which $51,000 is cash. During the past year, the union operated at $49,000 loss compared with a $47,000 surplus the previous year.

Actually, Mine-Mill's treasury would be wiped out if the union paid its obligation to CIO. It has not paid the 8c monthly per capita tax since last November, when CIO warned the left-wing affiliates to get in line "or else." The debt to CIO will reach $55,000 this month.

The convention approved the recommendation of Secretary-Treasurer Maurice E. Travis that this obligation be paid even if the CIO expels the union. There is little chance of payment, however, unless the Mine-Mill vs. CIO squabble is settled.

Signing of Taft-Hartley's non-Communist affidavits to "save" the union from raiding by other unions was approved. As he had done earlier in his public statement, Travis explained that, in giving up Communist Party membership, he (1) did not abandon his belief in Communist principles, and (2) did not think this created any conflict with his duties as a leader of Mine-Mill. He did not, he asserted, try to impose his views on other Mine-Mill members or try to enroll them as Communist Party members.

Imigration authorities refused to admit five delegates from Sudbury, Ont. They also barred Robert H. Carlin, Mine-Mill organizer in Canada, from this country for life. In a statement to the press, Carlin expressed surprise at this action, denied he is a Communist.

The convention approved the reports of President John Clark and Secretary-Treasurer Travis published in the Sept. 12 issue of the union's newspaper "The Union." The delegates then:

Reiterated opposition to the Marshall Plan, Atlantic Pact and support of WFTU, independent political action, contrary to CIO policy.

Approved a pact of mutual friendship and aid signed last April with the Mexican Miners Union.

Urged CIO President Philip Murray to reject the recommendations of the steel fact-finding panel denying a fourth round of wage increases.

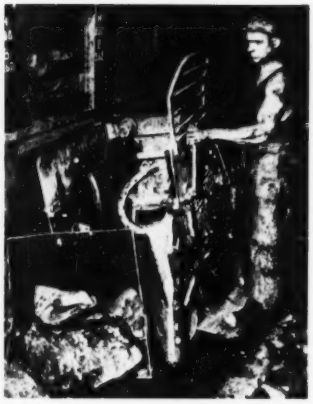
Urged passage of the mine subsidy bill, S. 2105; better mine health and safety laws with effective enforcement, the Brannan farm plan and many "New Deal" measures, including $1 minimum wage and repeal of Taft-Hartley.

Reaffirmed the union's aim to establish national bargaining in the industry.

Condemned incentive piecework and contract mining systems.

Approved the National Silicosis Commission established by the executive board.

Supported the union's bargaining demands of higher wages, improved welfare and pension plans financed by management and a shorter workweek.



ABOUT $2,000,000 WORTH of American equipment has meant higher production and more jobs in Dutch mines. This loader is operated in a mine at Treebeek, the Netherlands.

California Wins Mineral Deposit Suit

Long fought litigations in which the State of California sought $1,116,820 from the City of Los Angeles for damages to mineral deposits in Owens River Valley, closed with a $6,800 judgment by a Santa Barbara, Cal., Superior Court in favor of the State.

A year and a half of actual trial days were spent on the contention of the State that Los Angeles was negligent in releasing excess water from the Los Angeles Aqueduct, and from dams and reservoirs above the Owens (dry) Lake. The State held that the City, which had diverted Owens River water through its aqueduct since 1913, drying up Owens Lake, was responsible for keeping the lake dry and that floodings by the City since 1937 have injured brine deposits from which the State collects royalties.

The court denied that Los Angeles was negligent but granted $6,800 damages for royalties lost to the State for the period of flooding since early in 1937.

Rocky Mountain Group Elects Hutchinson

Charles J. Hutchinson of El Paso, was elected president of the Rocky Mountain Federation of Mineral Societies at the group's annual convention held recently in Albuquerque, N. M. He succeeds Guy M. Shockley.

Other officers elected were J. J. Brown of Austin, vice president and Mrs. Kathleen C. Miller of El Paso, secretary-treasurer.

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J&L Jalloy is a manganese-moly alloy steel heat-treated to resist abrasion and impact. It is a *modern* steel for products such as: chutes, conveyors, heavy-duty truck bodies, power-shovel buckets, dump cars, bulldozers, scrapers, rock crushers—products that must resist wear.

Heat-treated Jalloy is available in bar and plate form with widths up to 72 inches, lengths up to 20 feet, and thicknesses from 3/16 inch to $2\frac{1}{2}$ inches.

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AERIAL CABLEWAY transfers sintered manganese ore to stockpile at the African Manganese Mine, Nsuta, Gold Coast. Highly mechanized, this mine furnishes most of the manganese for Britain's steel industry.

Acting Head of Kennecott

The board of directors of the Kennecott Copper Corp. has named Carl T. Ulrich, vice president and treasurer, chief executive officer until such time as a president to succeed the late E. T. Stannard has been elected. It was also announced that Mr. Ulrich, for reasons of health, has requested retirement early in 1950.

J. C. Kinnear, vice president, was elected a director, and Anton Gray, chief geologist, was made a vice president of the corporation.

India Will Extract Silver From Coins

India has decided to erect a $1,800,000 silver refinery alongside the new mint now under construction in Calcutta for the extraction of silver from Indian coins in order to repay the 226,000,000 oz. sent to India by Lease-Lend from 1940 to 1946.

M. C. Mitter, master of the Bombay Mint, has been sent to Britain to arrange the supply of equipment for the refinery which is expected to take three years to erect.

Dominican Gold Control

The Dominican Republic has established strict control on the export of gold or auriferous minerals taken from Dominican mines or placers. The step has been taken in accordance with recommendations of the international Monetary Fund. Export of gold from the Dominican Republic in recent years fluctuated between 500 and 15,500 oz. annually.

Production Begins at Brazilian Pig Iron Plant

Pig iron production has begun at Companhia Acos Especiais Itabira, as the initial step of a special steel plant to supply Brazilian industry. Construction was begun early in 1947 and the blast furnace began functioning in April, this year. The company describes it as the world's largest charcoal pig blast furnace.

The plant will produce about 60,000 metric tons of pig iron per year and 2,000 metric tons of drop forgings at the start.

Tallest Stack Planned

El Paso smelting works of American Smelting & Refining Co. is planning to build the highest smokestack in the world, according to E. McL. Tittman, manager. The proposed chimney will rise 610 ft., topping the stack at ASARCO's Selby (Cal.) plant, considered at present the world's tallest, by five feet. (Japan is reported to have had a taller chimney which was destroyed in the war.)

The El Paso stack will be built by the Alphons Custodis Chimney Construction Co. of Chicago, at an estimated cost of $150,000. Work will begin this year and be completed by October, 1950.

Company officials said the new stack would replace one now in service. It will be 300 ft. higher than actually needed to assure the dispersion of smoke if operations increase.

MINING IN 1867

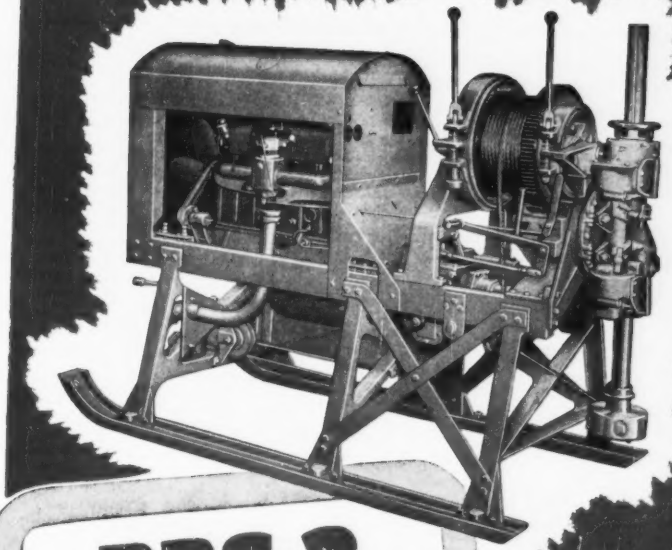
These items made news in E&MJ for October, 1867:

☛How to go to Montana: The emigrant to the gold fields of Montana has choice of several routes, the most feasible of which is up to the Missouri River by steamer, in the spring of the year, (the month of April being the most favorable for starting), from St. Louis to Fort Benton, at an average fare of $200 to $250 from Chicago, with 100 pounds of baggage. Fort Benton is about 75 miles from the gold fields, now discovered, and one hundred and thirty from Helena. Or, by railroad from Chicago, through Cedar Rapids, Omaha, and to the terminus of the railroad, now 300 miles west of the Missouri River; from thence by overland coach to Denver and Salt Lake to Virginia City, in Montana, about 1,400 miles by coach, at double the fare over the river route, with 25 pounds of baggage, and $1.50 per pound for extra baggage. Or with your own outfit, you can go across the plains with an emigrant train from Omaha and other points on the river to Virginia City, or from St. Paul to Helena, at but little save your own outfit for team, wagon, and provisions for a three months journey. On this route a line of coaches is to be put on.

☛Portion of an advertisement appearing in October, 1867: School of Mines, Columbia College, East 49th St., New York. The plan of this School embraces a three years' course for the degree of *Engineer of Mines*, or *Bachelor of Philosophy*.

For admission, candidates for a degree must pass an examination in Arithmetic, Algebra, Geometry and Plain Trigonometry. Persons not candidates for degrees are admitted without examination, and may pursue any or all of the subjects taught. The next session begins Oct. 7, 1867.

☛Aluminum Bronze: Of all the alloys which aluminum may be made to form with other metals, none promise to be more useful or beautiful in their application to the arts, than the various combinations of aluminum and copper, called by the general name of the aluminum bronze. The alloy containing 90% of copper and 10% of aluminum is especially adapted to a great number of applications; since it possesses a number of useful properties which are seldom united in one substance. Among these properties are hardness, malleability, tenacity, homogeneous structure, elasticity and resistance to organic acids.



BBS-2

THE ONE SURFACE CORE DRILL THAT MEETS ALL REQUIREMENTS

Within its drilling range (2400 feet), no other single surface diamond drill offers so many outstanding advantages to the practical driller. Designed to operate efficiently with any one of 4 interchangeable swivelheads The BBS-2 drills a wide range of diameters in every type of formation

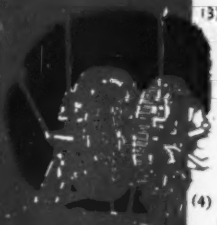
CAPACITIES: 2400 ft.—7/8" core.
2000 ft.—1-3/16" core
1500 ft.—1-5/8" core.
1300 ft.—2-1/8" core
900 ft.—2-3/4" core

WEIGHT. Equipped with selective four gear feed, as illustrated—2135 lbs. With hydraulic swivelhead, oil tank and pump—2825 lbs

POWER: 70 H.P. gasoline or diesel engine providing ample reserve power for all contingencies.

DRIVE: From engine to swivelhead and hoist through heavy duty single plate clutch, four speed transmission, and lubricated roller chain providing quiet, smooth, efficient operation. At full load under normal conditions this drive is 98% efficient. NO OTHER TYPE OF POWER TRANSMISSION CAN COMPARE IN THIS RESPECT

Only **BBS-2** *gives you all these features*



(1) Alternative: twin cylinder hydraulic feed swivelhead incorporating sensitive one valve feed control system. Takes 3-1/2 O.D. tubing through the drive tube. Drills at any angle.

(2) Alternative: friction feed swivelhead designed for rotary drilling. Handles rods, casings or pipe. Drills at any angle.

(3) Alternative: combination gear and friction feed swivelhead—either type of feed instantly available by merely shifting control lever. 4 forward and 4 reverse feed speeds. Drills at any angle.

(4) Hoist: New heavy duty hoist spools 5/8" cable, gives safe trouble-free hoisting at all speeds. A slip rope drum replaces hoist for continuous piping jobs.

566-B

WE LOOK INTO THE EARTH

BOYLES BROS
DRILLING COMPANY LTD.,
VANCOUVER, CANADA

PERSONAL NEWS

Harry J. Wolf, mining and consulting engineer, is now at 420 Madison Ave., New York.

Arthur Robert Sherman, native of Liberia and graduate of the Montana School of Mines, 1940, who is director of mines and geology for the Republic of Liberia in Africa, has been appointed as the Liberian representative to the United Nations Scientific Conference on conservation and utilization of resources.

Dr. George J. Grunenfelder, assistant superintendent of the zinc plant at the Great Falls reduction works, has accepted appointment as professor of metallurgy, Montana School of Mines. He succeeds **Prof. John P. Spielman,** who has resigned to accept the position as dean of the School of Mines at Pullman, Wash.

Charles A. Stephenson, of Asheville, N. C., has been elected president of North Carolina Magnesium Development Corp., succeeding **Dr. Fritz Hansgirg,** who died recently. Other officers named by the directors are **Ralph P. Grant,** vice president, and **Isaac Van Horn,** secretary-treasurer.

Carl Torrence has been appointed local plant superintendent of the new mica mining operations of the Funkhouser Co., at Hartwell, Ga. **F. C. McConnell,** general manager at the slate plant at Fairmount, Ga., general manager of Hartwell.

James Quigley recently completed a month's study of the new finds for the Centennial Development Co. of Eureka, Utah.

Grover C. Pidgeon, chief engineer of Phelps Dodge Corp.'s Copper Queen Branch, Bisbee, Ariz., has retired after 38 years with the Copper Queen.

Harold Q. Noack, Pasadena, Calif., formerly manager of Phelps Dodge Copper Products Corp., has been appointed assistant to **O. L. Pringle,** vice president in charge of sales for Columbia Steel Co.

C. O. Dunlop, president of Silver Dollar Mining Co., Spokane, Wash., accepted appointment to the Resolutions Committee of American Mining Congress' convention at Spokane.

Consolidated Mining & Smelting Co.'s annual $2,000 scholarship was awarded to **Robert Vallance, Jr.,** son of a veteran shift boss at Trail's Cominco's silver refinery. Mr. Vallance will attend the University of British Columbia.

E. W. Felegy, mining engineer, who has been experimenting with underground radio communication in various areas of the country, is now with the Duluth office of the U. S. Bureau of Mines. He will continue his experiments in the Lake Superior district.

Frank M. Bohan, chief electrician for Butler Brothers since 1925, has been appointed electrical supervisor for the M. A. Hanna Co. properties in Minnesota. He is succeeded at Butler Brothers by **Frank Ambrozich.**

Dr. Stanley Tyler, professor of geology at the University of Wisconsin, has been doing exploration work on the Marquette range of Michigan and in Canada during the summer.

Prof. A. K. Snelgrove, head of the department of geological engineering at Michigan College of Mining & Technology, recently visited the Vermilion range, in Minnesota, and the Steep Rock area, Ontario.

John L. Abramson has been promoted to traffic manager of the Duluth, Missabe & Iron Range Railroad, succeeding G. C. Ross, who has retired after 33 years of service.

Frank Rahne, formerly mill foreman at the M. A. Hanna Co.'s operation in Fillmore County, Minnesota, has been transferred to Ironton on the Cuyuna range.

Mottier Siebenthal has been transferred from the U. S. Bureau of Mines office at Dallas, Tex., to the Bureau's Duluth office.

H. C. Dudley, Duluth, Minn., has completed a visit to the Namiquipa mine (lead, silver, zinc) in Chihuahua, Mexico. The mine is operated by the Cia. Minera Venturosa, S.A., of which Mr. Dudley is president.

H. H. Schou, mine superintendent of the Copper Queen branch of the Phelps Dodge Corp., has been made chief engineer.

Herbert H. Lauer, plant manager of Glen Falls, N. Y., Portland Cement Co. for the past 6½ years, has resigned to enter into consulting engineering, with headquarters in Philadelphia. He designed and had charge of construction of the Waco, Texas plant of the Universal-Atlas Cement Co., and the San Juan cement plant, as well as numerous installations at all Atlas Portland Cement plants, mines, and quarries.

W. B. Boggs returned to New York late in August after spending nearly two months at the Skelleftshamn smelter of Boffden Mining Co. in Sweden. On this trip Mr. Boggs also paid a short visit to the Finnish smelter at Harjavalta, Finland.

Earl F. Hastings, mining and metallurgical engineer, has been appointed director of the Securities and Investments Division of the Arizona Corporation Commission. In accepting the appointment, Mr. Hastings resigned as secretary-treasurer of the Western Perlite Corp. and discontinued his consulting practice in mining and metallurgical engineering.

ROY ERWIN SWIFT, formerly on the faculty of Purdue University's Chemical & Metallurgical School, was awarded the degree of Doctor of Engineering by Yale University in June. He has joined the faculty of the Mackay School of Mines of the Univ. of Nevada to teach mining and metallurgy.

OBITUARIES

P. A. (Andy) Wickham, 73, operator of a silver mine on the west coast of Mexico, died Aug. 3 in Mazatlan, Mexico. A native of Erie, Pa., he graduated from the New Mexico School of Mines. For several years he was in charge of operations of the Little Ben Mining Co., at Landusky, Phillips County, Mont., but most of his active life was spent in Mexico, where he was associated with some of the foremost mining operators in North America.

Lee Bundy, metallurgist for Day Mines, Inc., Wallace, Idaho, died Aug. 14, at Wardner, Idaho. Prior to his association with Day Mines, he worked in many mills and mines throughout the west, and in Central America for La Luz Mines, of Siuma, Nicaragua. He was 40.

Francis B. Morehouse, 65, general manager of the Big Wedge (Atok) Gold Mining Co., died Aug. 5 at his home in Manila.

Harry S. Waste, retired mining engineer, died recently in Chico, Calif. A graduate of the University of California, he acted as mine superintendent in Shasta County, for a number ber years.

Ernest H. Nichols, superintendent of operations of the mica mine at Hartwell, Ga., of the Funkhouser Co., died in June.

W. N. P. Reed

W. N. P. Reed, for 30 years assistant editor of *Engineering and Mining Journal*, died in New York September 10, 1949 at the age of 77. Although he was known personally to only a few of the readers of this magazine, the quality of his contribution to *E&MJ* was evident on every page of every issue.

Will Reed quite literally read, and worked on, every word that went into the editorial content of the magazine. It was his job primarily: to check editorial copy for style, punctuation, and grammar; to keep track of the flow of material to and from the printer; and to read and correct galley and page proofs. We also counted on him to help keep us clear of libelous or merely ludicrous mistakes that every editor seems to make occasionally.

Will did this job with untiring zest and an intensity of pride that few among us could match. He believed firmly that *E&MJ* possessed both tradition and purpose, and his every working hour was given to holding these two elements to the highest possible standards. We could have no better guide for the future conduct of this magazine than those standards in which Will believed.

Born in New Britain, Conn., in 1870, Will Reed spent practically all of his life on, or within sight of, Manhattan Island. He had a great fondness for New York City, and loved nothing better than to reminisce on the slower-paced but vastly more enjoyable life one led when the name, Delmonico, meant something, when the Waldorf stood at 34th St., or back when the blizzard of Eighty-eight made history.

Will took up his father's profession of proofreader, and followed it all the sixty working years of his life. He read proof for the New York *Times*, then in 1892 he went over to the New York *Tribune*, where he had charge of the proofroom for 25 years. From 1927 to 1947 he taught proofreading and copyreading in a school of the New York Employing Printers Association. For this work, Will prepared a series of lessons that, combined in one volume, make the most exhaustive and also the most practical treatise on proofreading ever written. It has been translated into several foreign languages, and is used by students everywhere. The International Typographical Union, of which Will was a life-long member, uses these lessons as a guide.

In addition to his membership in New York Typographical Union No. 6, Will Reed maintained membership in the National Graphic Arts Education Guild, and the Printing Teachers Guild of New York. He believed firmly in the right of labor to organize, and he worked actively all his life in support of that belief. In 1932, for example, he was one of the two representatives of the "Big Six" printing unions who negotiated with the New York Publishers Association.

Although Will's failing health forced his retirement from active service in 1947, he continued to consult with *E&MJ* and other McGraw-Hill magazines on editorial matters until almost the day of his death. His interest never flagged. One of his last self-imposed tasks, which he carried through against terrific physical handicaps, was the examination and correction of a new edition of the McGraw-Hill style book, the grammatical authority for all McGraw-Hill magazines.

All in all, Will Reed had a good life. He worked hard at a job that he liked and that he did superlatively well. He was rich in the respect and affection of his family and his friends. He bore himself always as a gentleman should, in every sense of the word. He left his mark on the world, and at the end he had no cause for reproach or regret. None of us can ask or hope for more.

Charles Erb Wuensch

Charles Erb Wuensch, known as "Erb" to his many and widely distributed friends throughout the western mining world, died Aug. 27 in San Francisco. In his 57 years he firmly established his ability as an inventor and an engineer. He was always eager to help anyone in need and his friendliness and generosity will be greatly missed by all who knew him.

Mr. Wuensch received an E.M. degree from Colorado School of Mines in 1914, where he participated in athletics and showed early technical talent. After two years' experience with Empire Zinc Co., he went to Central America for a year on geological work. Subsequently engagements were with Thane Exploration Co., American Smelting & Refining Co., U. S. Smelting Co. and consulting work up to 1927.

Locating then in the Joplin, Mo., district, Mr. Wuensch became so interested in making the Missouri-Kansas Zinc Corp. a success that he developed the Differential Density (Heavy Media) Sink-Float Process that has since come into general use.

In 1940 he moved to San Francisco. Since then, consulting work in mining and metallurgy in the United States, Mexico and Central America have taken up part of his time, but the primary interest throughout his life was invention which he pursued with tremendous energy along many lines. Besides the Sink-Float Process, his best known development, his mind covered a wide range of ideas such as a powdered ore smelting process, borehole graviscope and engineers reconnoitergraph, drilling fluids, screening, thickening, density gage, diaphragm and centrifugal pumps, centrifugal ball mill and classifier, and other unfinished investigations. He also contributed technical articles for publication to advance the development and general knowledge on many of the above subjects.

He was a member of the AIME, the American Mining Congress and the Commonwealth Club of San Francisco.

The mining industry will miss his untiring energy and inventive enthusiasm and his friends will miss even more than the man himself, sociable, kindly and generous.

PHILIP J. MCGUIRE

San Francisco, Calif.

Arno S. Winther

The passing of Arno S. Winther on Aug. 20, at La Jolla, Calif., ended a distinguished career in mining.

He was born in Fergus Falls, Minn., on Feb. 4, 1882. He attended the University of Minnesota where he received his E.M. degree in 1903. From 1903-04 he practiced general mining at Park City, Utah. From 1904-1910 he was chief engineer, foreman, general mine foreman of Cerro de Pasco Copper Co., in Peru, where he worked under the late F. W. Maclennan.

He then returned to the United States in 1910 and was successively mine superintendent for Utah Consolidated Copper Co., Bingham Canyon, Utah; general manager, United Comstock Mining Co., Comstock, Nevada; 1924-1925, general manager, California Zinc Co.; 1925-1927, general manager, Rawley Mines Inc., Bonanza, Colo.; 1927-1929, general manager, Anna Beaver Mines Co., Cardin, Okla.

In 1929 he went to Africa as manager of Bwana M'Kubwa Copper Co., N'Kana, Northern Rhodesia. Later he was general manager, Rhokana Corporation, Ltd., where his experience was of a broad nature, as he had under his general supervision the operation of a large copper mine, sulphide flotation mill, smelter and electrolytic refinery.

In May, 1936, Mr. Winther became manager of Miami Copper Co., Miami, Ariz. He later became general manager of the company and its subsidiary, Castle Dome Copper Co., Inc., which positions he held until 1944 when illness forced him to retire temporarily. Upon his recovery he again became identified with these two companies and was appointed consulting engineer in May, 1947, which position

he held until his death on Aug. 20, 1949. In addition, he also served as consulting engineer with other mining interests.

The mining industry has sustained a great loss. Mr. Winther's modesty, unfailing courtesy and high integrity endeared him to all who had the good fortune to know and work with him.

SAM A. LEWISOHN

New York, N. Y.

Alexander W. Scott

Alexander W. Scott, known throughout mining circles in the Arctic, Canada and the U. S. as "Lucky," died in Yreka, Calif., in July.

Scott's fabulous career began modestly at the Ouray, Colo., property of Tom Walsh, the father of Mrs. Evalyn Walsh McLean, the late owner of the Hope diamond. His brother was superintendent there at that time. Through his youth Scott became associated with the big development of the day and in 1912 he organized an expedition to Baffin's Land to prospect in 78 deg. north latitude for gold. The saga of this trip was flashed upon screens in many cities of this country and Canada, as Scott had captured on film the first documentary of a voyage into the far north, and the actual real-life script was more exciting than any that could have been written on paper.

Upon his return to this country after serving with the French Legion during World War I, he became interested briefly in the oil business. This semi-successful detour from his own field of mining brought Scott back with renewed zeal for the quest for the yellow metal.

"Lucky" Scott was on hand for each successive "boom" from the '80's to the present. He was present for the 1906 excitement at Pioche, and when Tonopah and Goldfield were burgeoning camps, Scott controlled the Boston & Pioche Mining Co. holdings, the Rawhide Northern Consolidated Mines Co. and a group of properties in the House mining district in the Plumosa Range of Arizona.

In 1934, when radium was discovered in Alaska, Scott organized the El Bonanza mines at Crest Bear Lake, just with the Arctic Circle, to develop a large deposit of pitchblende.

Scott's quest for the earth's treasure had taken him into Africa, Alaska, West Indies, South and Central America, Mexico and nearly all of the western states. Throughout his busy life he was called upon by individuals and corporations to investigate specific claims in remote corners of the globe.

For the past 15 years his interests had been in mining properties in the Klamath River area around Happy Camp. At the time of his passing, at the age of 81, he was a part owner of two of the biggest properties within the Sickiyou County area; the big patented Cossen mine, known as the "Davis" estate, and the Copper Bluff property on the Hoppa Indian Reservation. Many Yreka and Happy Camp citizens hold shares in the latter, and Scott served successively as president of this company and as a member of its board of directors.

From a modest start with the Ouray property and the "Molly Gibson" mine at Aspen, Scott became within a few years one of the most successful and colorful mining engineers and promoters of his generation.

His infectious laugh, his great ambling stride, his generosity, his love of the humanities, and his penetrating grey eyes will be long remembered in many mining camps throughout the world.

He is survived by his daughter, Mrs. Ruth Lusch, of Reno, Nev., and several nieces and nephews in Toronto and Owen Sound, Canada.

RUTH LUSCH

Reno, Nev.

Walter Stalder

The death of Walter Stalder, consulting petroleum geologist, occurred without warning at the Oakland, Calif., home where he was born, on March 15. He was 67.

Walter received his B.S. degree from the University of California, College of Chemistry, in 1904. He worked for a chemical company from that year until 1907, when he obtained his M.S. degree from the University, with a thesis on "Northern California Petroleum." This was the first such thesis on the subject, and it was appropriate that he should be its author. A life-long booster of the possibilities of northern California oil and gas development, his particular interest was devoted to the Sutter (Marysville) Buttes and Rumsey Hills areas.

With the late Mark L. Requa and the Nevada Petroleum Co. from 1909 to 1913, he took time out in 1911 to engage in land valuation with the Union Oil Company of California. He resumed valuation work for the Independent Oil Producers during 1914 and 1915. From the time on he was an independent consultant.

Walter was a member of the AIME and in 1945 was chairman of the San Francisco section. He had been a life member of the Commonwealth Club of California since 1913, and often active in committee work for that organization. He was also long active with the California Academy of Sciences, and was a member of the American Association of Petroleum Geologists, the American Chemical Society, and the Seismological Society of America.

Among his many hobbies were gardening and the grafting of fruit trees, particularly apple trees. He was an active lodge member and a great favorite of the children of his Oakland neighborhood.

Walter was a man of contentious ideas who always made his presence felt, genially but persistently. He was a staunch defender of individual rights and of small operators versus large companies; and a firm believer in government economy and old time virtues. It is difficult for his many friends in the San Francisco Bay area to believe that they will not again hear Walter Stalder's voice raised in friendly argument.

WORTHEN BRADLEY

San Francisco, Calif.

LETTERS

The Editor:

In the May issue of the Journal there is an article by E. S. Tillinghast on the decline or dearth of students taking mining at the universities. He gives statements from seven deans of various colleges bearing on the subject. Aside from one paragraph in Prof. Plank's statement, I think they have all missed the boat.

Having graduated from the University of California some 45 years ago in mining when the course was designed to give a graduate a basic education in mining, metallurgy and geology, and now, having a son graduating from the same university in mining, I believe I have some idea of the change and also the attitude of the present generation.

For one thing it is practically impossible to induce one of the present class to take a foreign job. The distant mountains are no longer green.

I believe an almost complete answer to the article is contained in an advertisement on page 182 of your current issue under positions vacant. Let me preface it by stating that a miner in the West can make $12 a day and up.

"Chemist-assayer, college graduate, competent, experienced in fire assaying and wet determinations of lead, zinc, copper, gold, silver, tin, tungsten, bismuth, antimony, etc. In charge of laboratory employing 20 men and doing 9,000 assays monthly. Standard three-year contract, knowledge Spanish essential, base salary $4,200 yearly plus bonus one month. Single status or if married single status for six months. Free transportation to Bolivia."

In other words, after spending some 16 to 18 years in school and college and then some five or ten years to gain the necessary experience the man is offered the equivalent of a miner's wage in the States. Furthermore, if married he can leave his wife in the States and then if he has kept his nose clean and the company likes him they will let her join him.

Now, let us suppose that the General Electric Co., for instance, advertised for a man of similar competency and with the proviso that he should live for six months in a barracks and if satisfactory at the end of that time they would arrange for his wife to

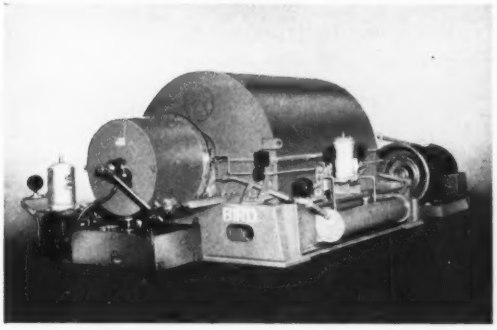
(*Continued on page* 150)

Why Let SLIMES

CUT DOWN YOUR REAGENT COST

AND JACK UP YOUR CELL CAPACITY

THE BIRD CENTRIFUGAL CLASSIFIER . . .



takes the slimes out of flotation feeds neatly and completely. Cuts as fine as a single micron are cleanly made. Chemical dispersion is rarely necessary. Slurries at ball mill consistency can be classified.

The Bird delivers up to a ton or more a minute. It runs continuously for months without overhaul. Operating cost is very low.

May we tell you more about it?

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

EQUIPMENT NEWS

Chain Saw	115	Dyna-Switch	114	Hardening Compound	115	Tire Remover	119
Classifier	114	Electric Motor	114	Hydraulic Dump	115	V-Belts	115
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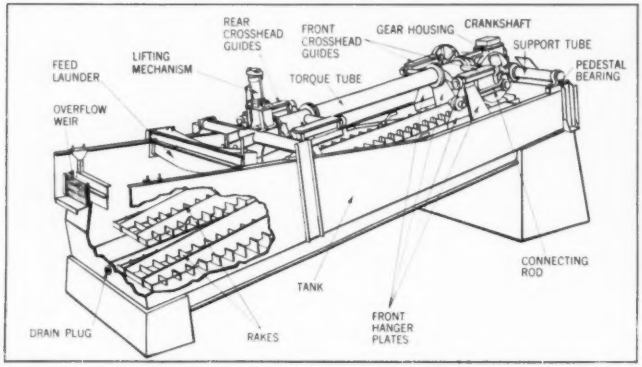
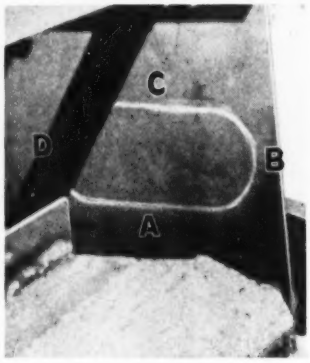


REVISED HEAD MOTION DESIGN on the new Type H Dorr classifier employs fewer moving parts than previous models. Entire mechanism is supported at only 3 points.



RAKE PATH is a "square-bite-stroke." Cushioned bite eliminates jar of impact.

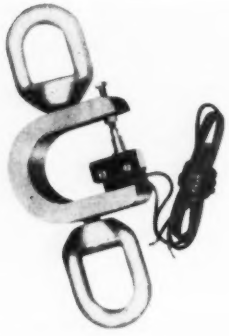
Design Changes Improve Classifier Operation

Basic changes in design of the new Dorr Type H. classifier are reported to offer several advantages over its predecessor, Type F. Revisions include a different rake path, a push button lifting device for heavy overloads, and 50% fewer moving parts than units of earlier design.

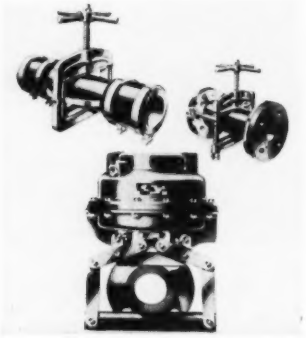
Rakes now follow a path which is a rectangle with rounded corners (see illustration). Raking and return strokes (A and C) are flat, while vertical strokes (B and D) form an ellipse. Gradual acceleration at the beginning of each working stroke eliminates jarring impact.

Rakes can be lifted 12 in. or more in heavy duty models, by an oil-actuated hydraulic lifting device. Instant lift is effected by push-button control. Height of lift is regulated by hand lever. Operated by a small motor driven pump, the device provides easy handling of overloads. Starting up after enforced shut-downs with a tank full of pulp presents no difficulties.

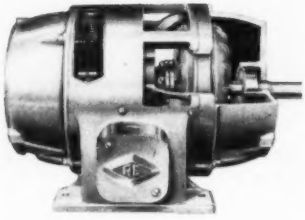
Inquires should be addressed to **Dorr Co.**, 570 Lexington Ave., New York 22, N. Y.



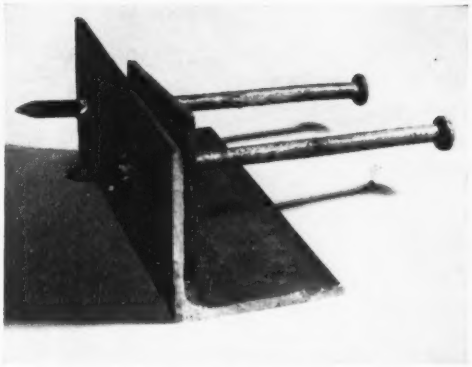
DYNA-SWITCH placed between hook and load on any crane or hoist, breaks circuit, cuts out motor if load is excessive. Developed by W. C. Dillon & Co., Inc., 5410 West Harrison St., Chicago 44, Ill.



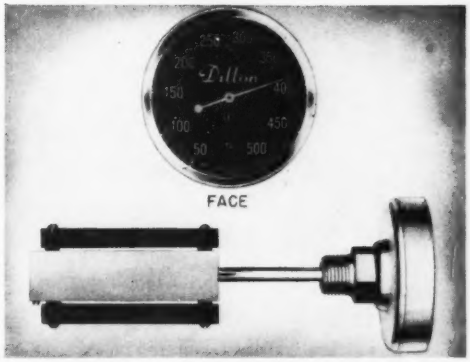
FLEX-VALVES has 3 new lines: slip-on type (½ to 2½-in. pipe sizes), flanged end (1 to 12 in.), and diaphragm motor for remote control (1 to 10 in.). All are made by Flexible Valve Corp., Palisades Park, N. J.



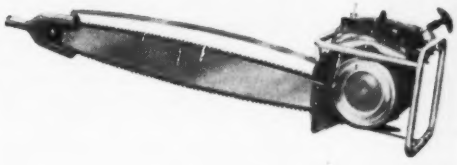
FLUID SHAFT electric motor features single frame, integral design of motor and fluid drive coupling. From ½ to 10-hp. units are available from Reuland Electric Company, Alhambra, Calif.



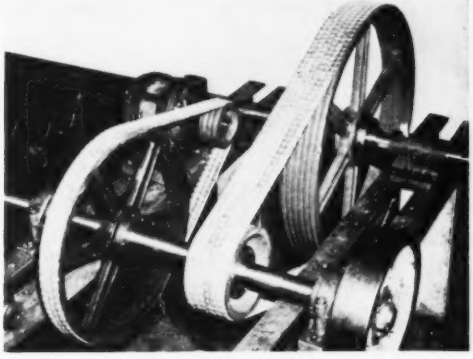
STEEL HARDENING COMPOUND makes sharpened wire nail hard enough to punch through 1/8 in. hot rolled or cold rolled steel. Manufacturer, Doughty Laboratories Inc., 307 E. 44th St., New York 17, N. Y., offers guarantee of results with this powder.



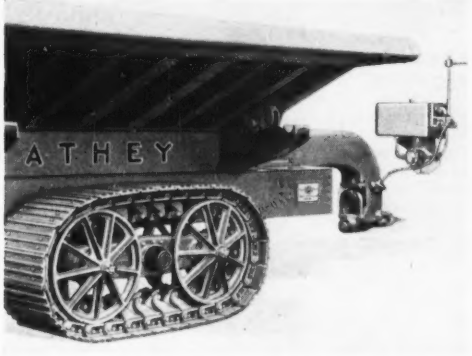
MAGNETIC THERMOMETER for use on flat surfaces (engine blocks, transformers, etc.) where round stem instruments can't be used. Magnet eliminates use of special fittings. Developed by W. C. Dillon & Co. 5410 West Harrison St., Chicago 44, Ill.



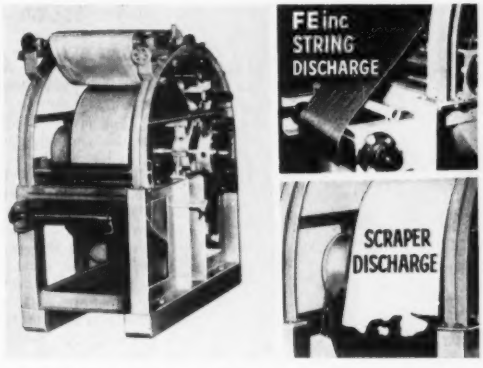
CHAIN SAW is powered by two-cycle, 4.2-hp. gasoline motor. Complete with guide bar, chain, guard and helper's end, the 36-in. saw weighs only 65 lb. Address inquiries on the "Timberhog 36" to Dept. H-22, Reed Prentice Corp., Worcester, Mass.



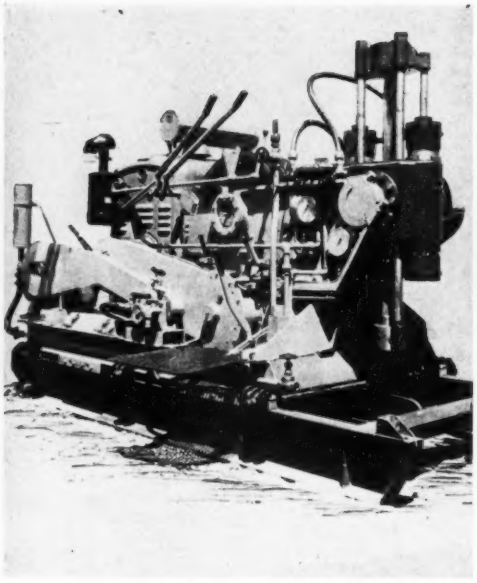
QUICK DETACHABLE V-BELT is adjustable to any length. It is easily uncoupled from roll stock as needed with no waste ends. Write Multi-V-Drive Sales Div., Worthington Pump and Machinery, P.O. Box 953, Buffalo 5, N.N.Y. for Bull. V-1400-B18.



HYDRAULIC PUMP UNITS for operating Forged-Trak dump trailers are now available for all types of tractors. The unit provides positive control of dumping while stationary or in motion. Athey Products Corp., 5631 W. 65th St., Chicago.



PILOT FILTER has submerged type washing mechanism which can be used for chemical washing, compression drying only, or can be disconnected entirely. For sale or rent from Filtration Engineers Inc., 155 Oraton St., Newark, N. J.

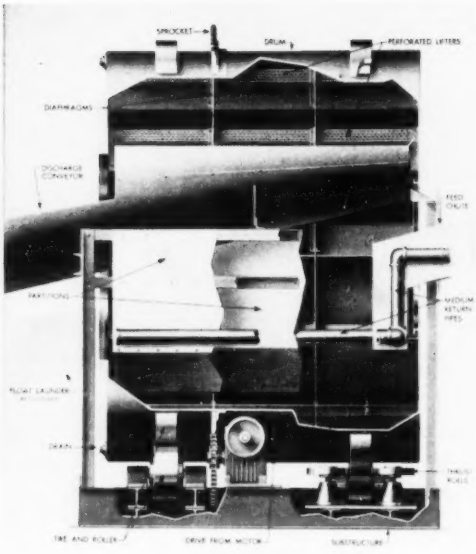


Can Drill 45-Degree Holes

New diamond drill, Seco 40, has a trunion-mounted drill head with 6-in. cylinders for making angle holes up to 45 deg. Hauling from such holes is achieved on the center line of the machine. The hoist drum is mounted transversely to facilitate this and to ensure correct fall of the rope in vertical hole hoisting.

A General Motors 43-hp. diesel provides power for drilling, hoisting and pumping.

The unit is being produced by **Steel Engineering Co. Ld.**, Roodeport, Transvaal.

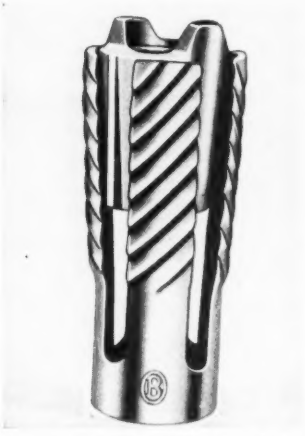


Separator Treats Coarse Feed

The Wemco drum separator, now in production, has been developed as a heavy media separation unit for treating coarser material. It can handle particle sizes ranging up to 8 in. Capacity of the largest unit is 420 tons per hour.

Separators are available in ten sizes from 6 to 14 ft., based on the outside diameter of the drum. Each unit is manufactured in two lengths.

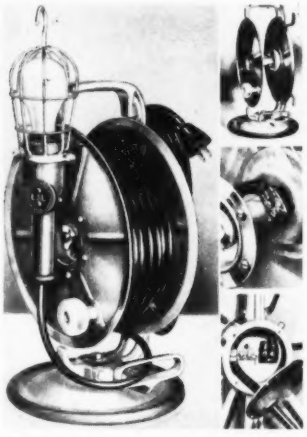
For descriptive literature and specifications, write **Western Machinery Co.**, Folsom St., San Francisco, Calif.



EXPANSION SHELL and plug for anchoring rods and bolts for roof support, are made by Ohio Brass Co., Mansfield, Ohio. Method of installing is described in the company's folder, 858-M.

Carbon Monoxide Detector

The presence of carbon monoxide in mines and other confined areas where powder smoke or other products of combustion may be prevalent can be detected in concentrations as low as 0.001% or less by volume with this colormetric tester made by **Mine Safety Appliances Co.**, Pittsburgh 8, Pa. One or more squeezes of the bulb, depending on sensitivity desired, aspirate air samples through a tube containing impregnated silica gel which turns a shade of green. Intensity of the shade is directly proportional to the CO concentration. The instrument comes in a leather carrying kit. Additional detector tubes are supplied in packages of 12. Write for bulletin No. BY-2.

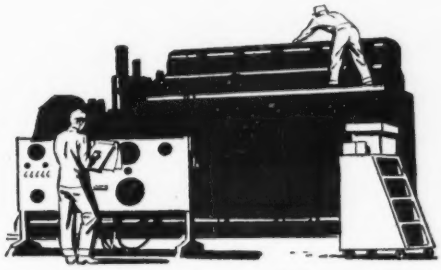


EXTENSION REEL eliminates wear, lengthens life of electrical cables. "Port-O-Reel" weighs 9 lbs., accommodates 150 ft. of No. 16 two-conductor cord. Made by Industrial Electrical Works, Omaha, Neb.

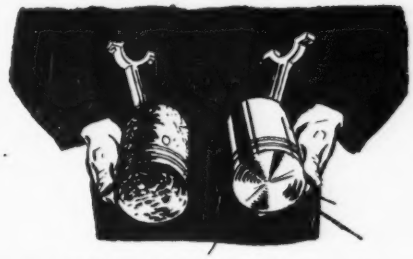
The famous purple* OIL

T5X SUPERIOR LUBRICATION FOR ANY INTERNAL COMBUSTION ENGINE!

T5X gives greater protection to any type of internal combustion engine in any industrial operation. Here are the reasons why:

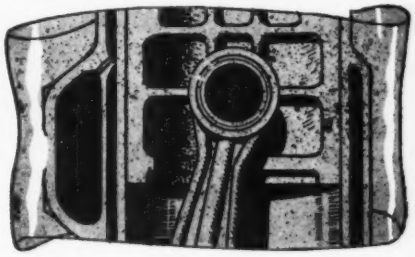


FIRST, T5X is a 100% pure, paraffin-base oil obtained from selected base stocks. It's a fully compounded, detergent-type oil that contains special rust and corrosion preventives.



SECOND, T5X contains an exclusive detergent compound that retards sludge formation to a remarkable degree. That means cleaner ring grooves, oil lines and pistons.

THIRD, T5X reduces wear to the minimum! A special inhibitor retards oxidation and gives high heat stability. A neutralizing agent combats acidity. Another ingredient suppresses foaming.



FOURTH, T5X forms an enduring oil film that gives maximum protection against scuffing and seizure. Rust and corrosion are held to a minimum by this tough film.

For full information on T5X phone your local Union Oil Representative or write Sales Dept., Union Oil Company, Los Angeles 14, Calif.

76 UNION OIL COMPANY
OF CALIFORNIA

*T5X gets its distinctive color from an exclusive ingredient that helps give the oil its remarkable stability.

"VIC" TELLS HOW

TO KEEP PIPING COSTS *DOWN*
WITH A COMPLETE
VICTAULIC SYSTEM

Make *every dollar count!* Let an ALL-VICTAULIC SYSTEM put an end to your piping problems and keep your piping costs *L-O-W!*

Yes! A complete VICTAULIC Piping System will save you lots of extra work, lots of extra expense. ALL-VICTAULIC Installations are unbeatable for on-the-job simplicity and adaptability!

Victaulic Couplings, Victaulic Full-Flow Elbows, Tees and other Fittings are designed for quick assembling and leak-tight dependability. Simple two-bolt connection for quick, easy hook-ups . . . a standard T-Wrench is the only tool needed! It's Victaulic for up-to-the-minute modern engineering and construction . . . Long-lasting, leak-proof joints assured . . . built for rugged usage . . . made to stand up under toughest pressure, vacuum, or strain!

"*Vic-Groover*" makes grooving those pipe ends easy . . . grooves 'em *automatically* in *half the time* of a conventional pipe threader!

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Write for:
*Victaulic Catalog and Engineering Manual No. 44.
*"Vic-Groover" Catalog No. VG-47.

FOR FULL ECONOMY...MAKE YOUR PIPING SYSTEM ALL VICTAULIC!

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For Export outside U. S. and Canada: PIPECO Couplings and Fittings · Pipe Couplings, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

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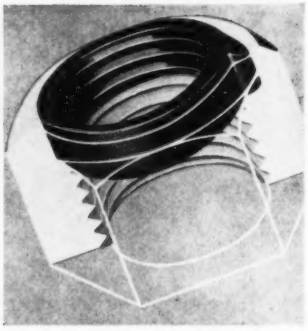


LOCKNUT offers positive locking, speed of application and repeated use does not lower locking power or wear out bolt threads. Made by Security Locknut Corp., 1815 North Long Ave., Chicago 39, Ill.

BULLETINS

Belt Conveyors. Well illustrated 64-page catalog includes engineering and application data along with dimensions and list prices. Copies are available from the Industrial Div. (Dept. K), Continental Gin Co., Birmingham 2, Ala.

Flame Hardener. Stearns-Roger Mfg. Co., Denver 2, Colo., has issued a new bulletin on the Denver Electronic Universal Flame Hardener.

Flotation. A 17-page illustrated bulletin on the Denver "Sub-A" Flotation unit has a brief discussion of the theory and application of flotation principles. Available from Denver Equipment Co., 1402 Seventeenth St., Denver 17, Colo.

Safety. The 1949-50 issue of "Everything in Safety," a complete catalog of protective equipment and industrial safety devices, can be had by writing E. D. Bullard Co.

Scrapers. Write Sauerman Bros., Inc., 584 South Clinton St., Chicago 7, Ill., for their 35-page well-illustrated booklet solutions to unusual and conventional material handling problems in outdoor and indoor bulk storage.

Drill Jibs. Pamphlet on drill jibs including the Joy Hydro Drill Jib can be obtained by writing the Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Pumps. A worthwhile addition to the engineer's bookshelf is "Handbook for Care of Centrifugal Pumps." Copies are available on request from Allis-Chalmers Mfg. Co., 969 S. 70th St., Milwauke, Wis. This bulletin, 08x6256A, contains no advertising.

Water Hoses. New York Belting and Packing Co., 1 Market St., Passaic, N. J., has published a new catalog covering its line of industrial, commercial and general purpose water hose.

Induction Motors. Special 32-page bulletin of Electric Machinery Mfg. Co., Minneapolis 13, Minn., covers basic theory, operation, characteristics and applications of large induction motors.

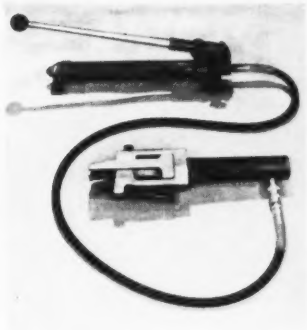
Dynalog Instruments. In a new 32-page bulletin (No. 427), the Foxboro Co., Foxboro, Mass., presents complete information on Dynalog instruments for process measurement and control.

Meters. Two new models of Shuntflo meters are fully described in Bulletin 400-F1 and 400-F2 of Builders-Providence, Inc., Providence 1, R. I.

Dragline Buckets. Operating techniques of dragline buckets are contained in Bulletin 2049, Page Engineering Co., Chicago 38, Ill.

Generating Sets. Bulletin No. 108 of Troy Engine & Machine Co., Troy, Pa., describes a. c. and d. c. generating sets with engineering data included.

FLUID DRIVE, power steering, hydraulic controls feature the Model C Scoop of Mixermobile Mfgrs., 6855 N.E. Halsey St., Portland 16, Ore. Scoop can be replaced by forks, crane boom.



HYDRAULIC TIRE REMOVER is compact and portable. Loosens beads of giant earthmover tires so that they may be removed from rims on the job. This saves time and labor. Under test conditions, new tool has withstood 18,000 lb. pressure at one spot on rim to break tire bead loose. Developed by Goodyear Tire and Rubber Co., Akron, Ohio, it operates on any Goodyear-designed tapered bead rim.

INDUSTRIAL NOTES

Harry T. Graham has been appointed assistant general sales manager for **General Refractories Co.**

Four divisional managers have been named by United States Rubber Co. to supervise electrical wire and cable sales. They are **Clarence H. Le Vee**, New York; **J. A. Leuver**, Chicago; **Don B. Karlskind**, Dallas; and **L. M. Guibara**, Los Angeles.

Chain Belt Co. has announced the appointment of **John C. Toomey** as district sales engineer in Detroit.

S. N. Morison and **E. W. "Ted" Chapman** are manager of industrial sales and assistant sales manager respectively, for **S. G. Taylor Chain Co.**

Oliver United Filters has transferred **Graham Lee** to the eastern sales division, New York.

Frank O. Walsh has been named sales representative in the Southeast for the Heavy Machinery Division of **Nordberg Mfg. Co.**

Mark C. Simpson has been appointed sales manager, Pennsylvania Div. of **Templeton, Kenly & Co.**

American Steel & Wire Co. has promoted **Edward A. Murray** to manager of the Chicago sales office.

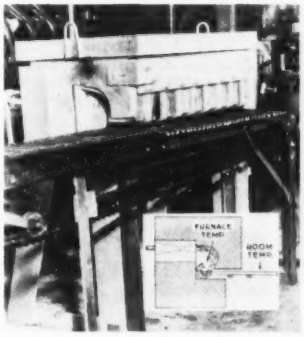
John E. Despins is now manager of the El Paso branch of **Allis-Chalmers'** general machinery division.

Le Roi Co. has appointed **Emmett G. Simmons** as West Coast manager in San Carlos, Cal.

J. R. Brisley has been named district manager at Baltimore by the **Jeffrey Mfg. Co. Charles E. Lawall, Jr.**, has been assigned to the Philadelphia office.

The appointment of **L. C. Richardson** as sales representative, Intermountain territory, has been announced by **Ridge Tool Co.**

VALVE AUTOMATICALLY DRAINS off all water and oil that may collect in compressed air lines, along with dirt, rust, and dust particles. Made by Wilkerson Valve Inc., 260 S. Dale Ct., Denver, Colo.



END-HEATING FURNACE can be used for forging, swaging, annealing, hardening. Numerous small high pressure burners use any commercial gas. Made by Gas Appliance Service, Inc., 1211 Webster Ave., Chicago, Ill.

EQUIPMENT SHORTS

Electric Motor. Totally enclosed "Slo-Speed" geared motor is cooled by external fan. Type **FWFB** motor can be mounted in any position without modification. Made by **Sterling Electric Motors, Inc.**, Los Angeles, Calif.

Concrete Mixer. Portable (147 lb.) concrete mixer handles 3 cu. ft. wet mix per batch. Mixing time is 2 min. Unit is available with hand drive or electric or gasoline engine power. Inquire **Denver Equipment Co.**, Dept., 510, Denver 17, Colo.

Mercury Still. Push button mercury still has electronic controls, induction heating. Uses 500 w. to produce 5 to 7 lb. of distilled mercury per hour. Occupies 18x24-in. floor space, stands 6 ft. high. Made by **Eberbach & Son Co.**, Ann Arbor, Mich.

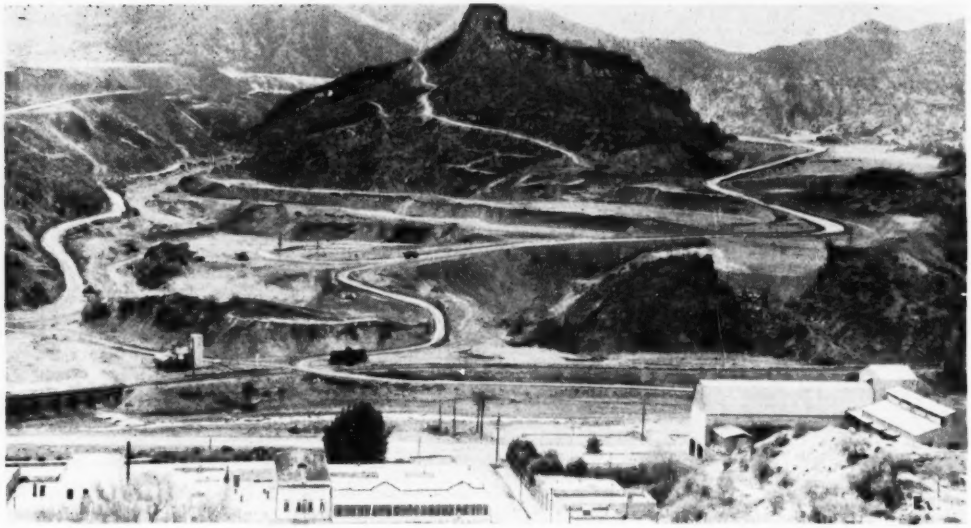
Safety Glasses. Instant replacement or readjustment of one-piece "Optilite" lens is feature of new safety spectacle, manufactured as "Saf-I-Spec" by **United States Safety Service Co.**, Kansas City 6, Mo.

Submersible Pump. "Enpo" submersible utility pump is centrifugal type, delivers 3,000 gph. The ¼-hp., single phase, 115-v. motor is hermetically sealed. Literature can be obtained from **Piqua Machine & Manufacturing Co.**, Piqua, Ohio.

Safety Lamp. Junior Flame Safety Lamp is lighter and smaller than standard models but has many interchangeable parts. Is said to burn longer and cooler than standard models. Write for Bulletin BJ-4 to **Mine Safety Appliances Co.**, Pittsburgh 8, Pa.

Geiger Counter. Compact counter weighs two lbs., measures 2¾x4½x5¾ in. Model RD-1 sells for $59.50. With bulb for visual detection, price is $67.50. Made by **Nucleonic Corp. of Allis-Chalmers Mfg. Co.**, Milwaukee.

REGIONAL NEWS



STRIPPING OPERATIONS keep two electric and four diesel shovels busy at Ray, Ariz., division of Kennecott Copper Corp. The area, known as Copper Canyon, is over old underground workings. Benching has been in progress for a year and a half. Eventual cut will go to cone-shaped peak on hill at center. Final cut will be approximately 800 ft. below the surface.

ALABAMA

★Ore mining for the **Tennessee Coal, Iron and Railroad Co.** was disrupted during late August when 4,500 union miners were affected by a six-day work stoppage.

The walkout started at the Ishkooda mines after miners complained that the company had put an extra workload on them. Mines in the Wenonah and Muscoda area joined in the walkout.

ALASKA

★Work on the U. S. Bureau of Mines' $184,000 building on Juneau Island was begun in June. "If work proceeds on schedule," Dr. James Boyd, Bureau Director, said, "it will become possible for metallurgists to conduct tests on Alaskan ore right in the territory, early in 1950, and give on-the-spot advice to mine operators on ways of solving their ore-dressing and beneficiation problems."

★Fairbanks Mine Workers Union No. 444 and **U. S. Smelting, Refining and Mining Co.'s** Fairbank's exploration department, ended their month-old wage discussion amicably. Only one group, first class garage mechanics, received an increase (10c. an hour). Traveling time between camps will be paid and better commissary privileges have been granted. The Union had asked an over-all 35c. an hour increase.

★Mining men may organize here to influence Congress to again grant small companies the $30,000 exemption which the SEC cancelled. Owners of patented mining properties claim to be taking a beating under the federal securities law as it now stands. Financing is almost impossible.

★Iron ore in the **Poorman mine,** near Kasaan, is being examined by engineers from Duluth, Minn. An estimated million tons of ore was reported by the Bureau of Mines after its 1943 drilling program. The ore may contain gold and copper values also.

★Wendell Dawson is operating his gold mine near Harris Creek on Prince of Wales Island in the Ketchikan district.

★Preparatory work was done this season at **Yukon Placer Mining Co.'s** property in the Sixtymile area, but the dredge probably will not be operated until next year. The company's properties at Jack Wade, Fourth of July Creek, Canyon Creek and Walker's Fork were in production this year.

★E. Nesland who started operations on the H. S. Wanamaker property on Vermont Creek in the Koyukuk district, in April, found gold nuggets as large as 4 oz. this summer. Nesland went in with a bulldozer and other equipment.

★According to George Sundborg, consultant to the Alaska Development Board, **Vermont Marble Co.,** which formerly worked the quarry at Tokeen, may resume its operations.

ARIZONA

★Indians on the Navajo Window Rock reservation are being issued special two-year mining permits, less restrictive in character than regular mining leases, to promote uranium mining development.

It is hoped that the system will encourage a good number of small individual mining operations on the reservation, believed to be one of the major uranium sources in the country.

★A new uranium find has been reported by the Arizona Department of Mineral Resources. Tests by the Atomic Energy Commission indicate the **Hillside mine** near Prescott in Yavapai County is high in commercial grade ore, Charles Dunning, department director, said.

★**Phelps Dodge Corp.** recently laid off 800 men at its Copper Queen underground mining branch at Bisbee.

★Mining claims on state lands are subject to a $15 annual fee no matter

how many claims are covered in one lease, the state attorney general has advised. He held that the claim, and not the lease, is subject to the charge. Thus a fee is due on each claim covered.

CALIFORNIA—Central Eureka increases production. — Yuba conducts tests.

★Associates of the late L. V. Storrs reportedly are planning to operate the **Never Sweat** gold property near West Point in Calaveras County which Mr. Storrs reopened two years ago. He developed four shoots of ore and installed a mill to treat 20 tons of ore daily before his death.

★**Yuba Consolidated Gold Fields** is conducting tests at Sunny View Ranch near Chico in Butte County and expects to open dredging operations by winter. H. C. Perring, general superintendent for Yuba, reported that dredging equipment still on the site from former activities abandoned in 1942, was being reconditioned.

★**New Idria Mining Co.** is conducting limited exploratory work at its property near Hollister in San Benito County. C. Hyde Lewis, manager, said that the mine will not be returned to production unless mercury prices rise to $150 per 76-lb. flask.

★**Central Eureka Mining Co.** has increased ore production at its gold property in Sutter Creek, Amador County, from 140 tons to an average of 200 tons per day, according to an announcement by J. D. Swift, president. Two new orebodies have been developed, one on the 3,400-ft. level and the other on the 3,800-ft. level, with gold values running from 1 oz. to 3 oz. per ton. The company reports the labor situation greatly improved, and attributes the increase in production in part to the influx of experienced hard rock miners into the Mother Lode area. About 160 men are now employed in the mine and mill under the direction of J. D. Swift.

★The Merced County board of supervisors has denied the **Snelling Gold Dredging Co.** permission to dredge 1½ mi. of abandoned railway right-of-way between Snelling and Merced Falls.

Maintaining the land was non-agricultural, the company had asked not only a dredging permit but exemption from leveling and resoiling. Mosquito control officials opposed the concession, contending that dredge potholes make mosquito breeding grounds. Civic groups objected to turning even marginal lands into "piles of rock."

★Installation of a 100-ton mill is expected to be completed in November at the **Sarita gold mine** in the Masonic district in Mono County. The property is controlled and operated by the

SPEED · FOOTAGE AND HIGH DIAMOND SALVAGE

The HARDHED Bit contains selected, small diamonds, securely moulded in a tungsten alloy matrix. As it wears away, free-cutting edges are continuously exposed.

HARDHED Bits are recommended for drilling all types of ground, except extremely broken or abrasive formations. The HARDHED 55 Bit is recommended for drilling badly broken, highly abrasive formations. A special tungsten-carbide matrix enables it to stand up under the most exacting conditions where other bits fail.

Available in standard sizes and types. Special or off-standard bits to your order. Catalog on request.

J. K. SMIT & SONS, INC.

Gen'l Offices & Plant: MURRAY HILL, N. J.

In Canada: 129 Adelaide St. West, Toronto, Ont.

EST. 1888

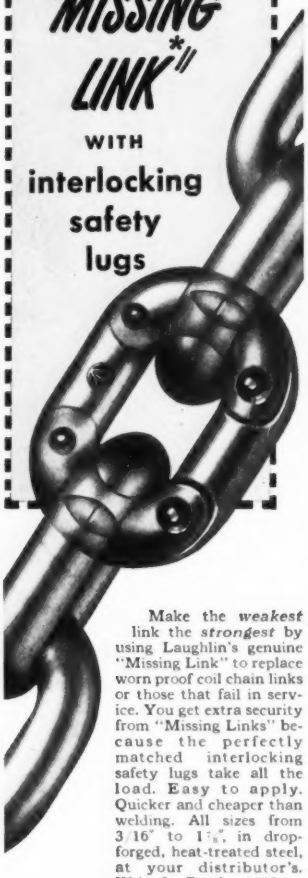
Stronger than the chain itself!

THE LAUGHLIN

"MISSING LINK*"

WITH

interlocking safety lugs



Make the *weakest* link the *strongest* by using Laughlin's genuine "Missing Link" to replace worn proof coil chain links or those that fail in service. You get extra security from "Missing Links" because the perfectly matched interlocking safety lugs take all the load. Easy to apply. Quicker and cheaper than welding. All sizes from 3/16" to 1 1/8", in drop-forged, heat-treated steel, at your distributor's. Write for Catalog #145 . . . industry's data book of fittings. THE THOMAS LAUGHLIN COMPANY, DEPT. 5, PORTLAND 6, MAINE.

*Reg. U. S. Pat. Off.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

California *(Continued)*

Blackmore-Whinery interests of Einnemucca, Nev. Operation of the mill will be supervised by Ray Towers.

COLORADO—Modern equipment demonstrated for mining carnotite. — Construction progresses on Carlton mill.

★Seventy men are now employed in the construction of the **Golden Cycle Corp.**'s new Carlton mill midway between Cripple Creek and Victor. The back wall of the new structure and the back wall of the second terrace are completed. A new pipe line has been laid to a point just below the Cresson mine.

Milling machinery, both newly purchased and some from the Golden Cycle mill in Colorado Springs, is now beginning to arrive for installation at the new Carlton mill. A new crusher unit is now at the Portland mine where it is being made ready for installation in the mill, and flotation units are now being conditioned in machine shops of the district. Two new rod mills and structural steel has also arrived at the mill site.

★Mount Antero, noted gem peak in the Sawatch Range of central Colorado, was nominally proclaimed a Mineral Park by the Colorado Mineral Society at colorful ceremonies on Aug. 1. A bronze tablet was set in one of the granite boulders at the top. A mine near the 14,245-ft. mountain peak has been a producer of gem aquamarine and other rare minerals from pockets in pegmatites. Equipment for mining gems must be packed in along a trail that rises over 5,000 ft. in seven miles. The state-wide mineral society maintained a field camp there during the summer of 1948.

★Demonstrations in the use of modern type machinery and equipment in the mining of carnotite ore, carrying uranium and vanadium, were given in August at the **Small Spot mine** on Maverick mesa, operated by Fred Sturm and associates. Equipment demonstrated during the day included rock drills, compressors, tractors, stopers, with a full line of machinery needed for both underground and surface work.

★Shipments of equipment to the newly erected **Silver Shield Mining & Milling Co.**'s mill, in the Ouray mining district, are nearly completed. A 250-ton company and custom plant will be operated soon according to L. E. Stein, manager. The mill was dismantled at Hawthorne, Nev., and transported to its present side. Cost of dismantling, hauling, erecting and purchase of new additional equipment cost approximately $125,000 in addition to original cost of mill.

★Sam Silverstein and associates are opening the old workings of the **Valentine mine** up Trail Creek near Idaho Springs. The ores are mostly gold.

★The outlook for the gold mining industry is improving right along in the opinion of Merrill E. Shoup, president of the **Golden Cycle Corp.**, now constructing a large gold mill at Cripple Creek. Mr. Shoup expressed the opinion that the prospects for governmental action regarding gold have become much brighter in the last few weeks.

★**Champion Mines,** operating the Jerry - Johnon - Forest Queen - WPH group at Cripple Creek, now employs two shifts sinking the Forest Queen shaft, according to Jesse Simmons, president. The company announced that grab samples from the bottom have shown good assay values in gold. Plans are to deepen the shaft 200 ft. below the bottom level at 955 ft. and then develop laterally. The Forest Queen shaft was reconditioned down to 955 ft. before sinking began.

★Mineralogical society members and their families and guests visited the **Telluride Mines, Inc.,** as part of an all day field trip. Harold Worcester, general manager of Telluride Mines, Inc., gave a short address and then conducted the group around the mill area, where members worked the various ore dumps for mineral specimens.

★The second of two dragline gold dredges operated near Twin Lakes on the Hayden and Mt. Elbert placers by the **General Gold Corp.** of Sacramento, Calif., will swing into action under electric power within the next month, Robert Gerke, superintendent, reports. The gold washing plants, out of service so far this season due to a switch from diesel to electric power, should be ready to operate by Sept. 1. Both machines in the dredging operation, two miles north of Twin Lakes, will run a total of 7,000 to 8,000 yd. of dirt daily, Gerke said. This is the third season that the dredges have been operating here.

GEORGIA

★Georgia's brown iron ore mining industry has taken a spurt in activities during recent weeks with shipments averaging over 50 cars a day. Activity in the industry, which has invested over $1,500,000 in property and equipment, was somewhat slow during early summer but demand has increased of late.

Several mines have reopened or increased production. Some new equipment has been added.

Hodge Mining Co., Cartersville. John Hodge, manager, operating at Iron Hill in Bartow County, has opened a new mine near Canton in Cherokee County. The company has constructed a $100,000 plant to process brown iron ore from a large de-

posit. At present 14 cars per day are being shipped.

Arrington Mining Co. now has two washing plants at its mine near Cedartown and is shipping 10 cars per day.

Gamage Mining Co. is shipping six cars of ore per day from the old Grady mine between Rockmont and Cedartown.

Bowen Construction Co., Cartersville, has gone into the mining business and is working the F. Smith property near Cartersville. Four cars of the limonite brown ore are being shipped each day.

Albea York Mining Co., Cedartown, is shipping four cars of brown ore a day with present rate of operations.

A massive deposit of limonite near Canton has been opened by the **Clarke and Connor Mining Co.** and at present, shipments average five cars per day.

Hale-Georgia Mineral Co., Cartersville, has installed a new crusher, larger than the present one in operation, to increase production of brown iron ore. The company is shipping six cars of ore per day.

The Georgia ore, which is rich in manganese, is being shipped to steel mills in Alabama where it is mixed with red ore to produce pig and manganese steel.

A. P. Greene Firebrick Co., Mexico, Mo., has closed down its kyanite bladed type operations near Clarksville and is selling its equipment.

★Capt. Garland Peyton, director of the Georgia Department of Geology, Mines and Mining, reports that a sillimanite deposit of the crystaline type has been located just east of Hartwell running in a belt about 20 miles long and up to 2 miles wide. The rich deposit runs southwest, just east of Bowman and east of Comer. Tests are now being conducted by the U. S. Bureau of Mines and the TVA. Concentrates are being made at the Muscle Shoals plant of TVA.

Highly valuable as refractory material, sillimanite has been used as electric insulators and in furnaces of naval vessels. Upon completion of present tests, plans are to develop present known deposits.

★Experiments are now being made at Georgia mines to reduce losses in processing mica. It is estimated that about two-thirds of mined mica is lost.

IDAHO—Coeur d'Alene labor situation is tense.—The Nancy Lee reports rich strike.

★Coeur d'Alene district mine operators and the IUMM&SW (CIO) union have been in dispute over a new wage contract for the last two and a half months, unable to agree on a welfare and pension program sponsored by the union. Mine operators agree to maintain the prevailing wage on a 6-day work week with time-and-a-half

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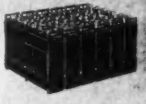

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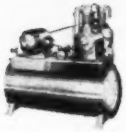
MODELS NUMBER 20 AND 35 COMPRESSORS . . . complete self contained engine driven units with capacities of twenty and thirty-five feet of actual air, available in a variety of mountings and assemblies.



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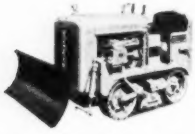

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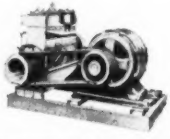
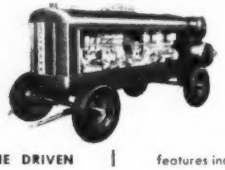
MODEL 50 "BUILT-IN" MOTOR DRIVE . . . the overhead tank unit is only one of the many models and combinations of this small compact industrial compressor that can be bolted direct to any substantial floor.

TRAILER WITH STREAMLINED TOOL BOXES AND LIVE HOSE REELS . . . designed for quick handling, this trailer type is equipped with towing ring or universal coupling for attaching to car or truck.



"V" BELT DRIVE ON BASE WITH MOTOR . . . this type assembly has proved very popular because it permits the use of the most advantageous operating speeds where only odd frequencies and voltages are available.



MODEL #315 DIESEL ENGINE DRIVEN COMPRESSOR . . . a powerful and economical unit built for heavy duty work . . . will operate three hard-hitting rotating rock drills, or one big wagon drill. Some of the features include: electric push button starting, automatic start and stop control, centrally located control panel, SCHRAMM patented mechanical intake valves, and many other features.

WRITE FOR BULLETIN SE-48

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PA.

GOV. C. A. ROBINS of Idaho (right) is being shown the newly dedicated Bradley smelter at Stibnite by Frank Souders, plant foreman. The $1,500,000 smelter will produce antimony and precious metals.

Idaho *(Continued)*

for overtime and an open shop. The smelter workers at the Bunker Hill smelter at Kellogg have been the first to walk out on strike, closing smelter operations. Miners at the Dayrock mine of the **Day Mines Co.**, numbering over 100 men, quickly followed. The Mullan local union signed the contract to continue work at the prevailing wage conditions. Closing of the Bunker Hill smelter forced the Sidney mine to suspend operations.

The union claims an overwhelming strike vote, but J. B. Haffner, manager of the Bunker Hill, has challenged the union to permit a secret vote, conducted by public observers among Bunker Hill employees on the question of accepting or refusing the company's offer of a six-day work week contract. This challenge is in reply to a suggestion made by Harry Murray, president of the Kellogg local union, for a public negotiation of the dispute. Disagreement is over a health and welfare program which the union has labeled a "must" provision. In his challenge, Mr. Haffner says:

"During your negotiations we have repeatedly heard your committee stress the democracy of your union procedure. This is your chance to prove it.

"Therefore I know you have no objection to having a secret vote conducted by public observers selected by you and us at civic polling places where all our employees can vote. We will be glad to turn over our payroll lists of employees to these public officials if you will return your acceptance by immediate mail. This is your opportunity to prove to the public that your union is truly a democratic organization and will be guided by the voice of the majority of all our employees whom you represent.

"You have a responsibility of representing all the employees as a collective bargaining agent, not just those who choose to belong to your union. You speak for all the employees, so why don't you let them all

vote? They all work here. They all have a stake in this issue. They are all affected. According to your records, of the 4,900 men working in this district only 2,121 voted on the so-called strike vote and on the so-called rejection of the six-day work week offer."

The prevailing wage contract is as follows; covering a 6-day week with time-and-a-half pay for overtime in excess of a 40-hour week:

Coeur d'Alene Wage Scale for 8-hr. Shift.

Miner	$11.65
Surface labor	10.90
Mucker	11.15
Timberman	12.15
Timber repairman	12.40
Raise miner	12.15
Drift miner	12.15
Sinking shaftman	12.65
Mainline motorman (trolley)	12.15
Mainline motorman (battery)	12.90
Level motorman	11.65
Swampers (main line trolley)	11.65
Swamper	11.40
Cagers	11.40
Mucking machineman	11.65
Trackman	11.65
Pumpman	11.40
Pipeman	11.90
Nipper and powderman	11.65
Bullgang (yard and common labor)	11.90
Mechanic, first class	12.40
Mechanic, second class	11.90
Welders, first class	12.40
Welders, second class	11.90
Blacksmiths	12.40
Carpenters	12.40
Helpers (all classifications)	11.40
Shaft repairman	12.65
Truckdriver (heavy)	11.65
Truckdriver (light)	11.65
Watchman	11.40

Mill Classification and Rates

Flotation operator	11.90
Repairman	11.90
Millman	11.40
Mill labor (inside)	11.15
Repairman helper	11.40
Common labor	10.90

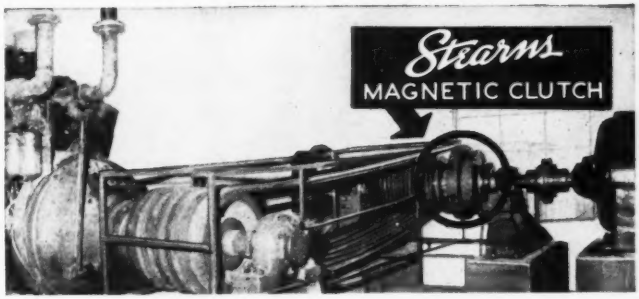
Sawmill Rates

Head sawyer	12.15
Sawmill operator or helper	11.40
Sawmill labor	10.90

★**Golconda Mining Co.** has received net smelter returns of $14,337.34 for a shipment of lead and zinc ore in the form of concentrates. The lead ore totaled 44 tons, and assayed 73.05% lead, and 62.04 oz. silver per ton. The zinc concentrates assayed 55% zinc and 10 oz. silver. This is one of a number of shipments made this year which came from a new discovery on the Golconda vein on the 1,000-ft. level. This oreshoot is 500 ft. long and 4 to 10 ft. wide. The company is now drifting on this vein in Square Deal ground east of a fault which shifted the vein some 60 ft. to the north.

★**The Washington-Idaho Mining Co.**, adjoining the Charles Dickens property on Moon Gulch east of Kellogg, is stockpiling ore preparatory to treatment at Zanetti Brothers' galena mill in Wallace. The ore is a development product and assays 3% lead, 4 oz. silver and 3% zinc.

★**Lucky Friday Silver-Lead Mining Co.** encountered a "blind" vein 12 ft. wide in driving a crosscut on the 1,600-ft. level to the main vein which is some 300 ft. south of the shaft. Average assays for the new vein runs



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Whatever your transmission problem, investigate Stearns Magnetic clutches and clutch-brake combinations before you buy. With a Stearns Magnetic clutch, the action is smooth and even and the load is picked up without jerk or jar to the machinery to be coupled.

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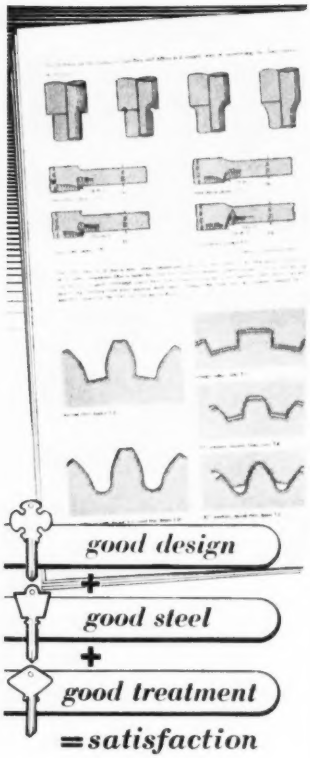

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IDAHO *(Continued)*

2% lead and 8 oz. silver per ton. The **Hunter Creek Mining Co.**, adjoining the Lucky Friday on the north, plans to take the contract of sinking the Lucky Friday shaft from the 1,600-ft. level to the 2,000-ft. level for the privilege of crosscutting to a favorable vein structure in Hunter Creek ground. The last vein cut in the crosscut is 6-ft. wide of siderite heavily mineralized with galena ore and assays 4.6% lead, 19 oz. silver, and 2.4% copper.

★E. G. Smith, of Wallace, who holds a 10-year lease on the **Nancy Lee Mining Co.'s** King & Queen mine near Superior, Mont., reports that the orebody recently discovered in a lower tunnel on the property has developed an important shoot of ore that will average good values in silver and commercial values. The shoot is about 10 ft. wide and has been followed for 50 ft. Smith has been milling a good grade silver-lead ore from the vein for the past two years. The Nancy Lee company receives a royalty of 15% on the ore produced.

★After many years of inactivity, the **Park Copper & Gold Mining Co.**, in the Stevens Peak area south of Mullan, has been revived. The company was incorporated about 50 years ago. Considerable development work was done on a siderite vein containing chalcopyrite.

★**Hansy Copper & Gold Mining Co.**, 3 miles east of Adair, Idaho, south of Wallace, is stoping high-grade copper ore on three different levels. The ore averages 15.4% copper, 2 oz. silver, and 0.14 oz. gold per ton, according to Sam Peterson, manager. The company is building 100-ton ore bunkers at the mine preparatory to shipping to the Anaconda smelter as soon as the Forest service has completed a haulage road to the property. The high-grade ore is 6 ft. wide.

★**New Rainbow Mining Co.**, prospecting a promising mineral showing in the western section of the Coeur d'Alene district west of Kellogg, has awarded a contract for driving 700 ft. of tunnel work. The company has completed an exploratory shaft of the outcrop of the vein to a depth of 50 ft. exposing a wide vein containing values in silver and lead.

★**Ace Gold Mines Co.**, on the south fork of the Clearwater River near the old mining town of Fall Creek, has started producing tungsten ore from the mine's old workings, according to E. C. Funke, of Lewiston, secretary. The mine was first discovered in 1910 and was worked for its gold values, which proved to be insufficient. The tungsten content of the ore was not discovered until recently.

★**Day Mines, Inc.**, reports that the company mines produced 86,450 tons of ore in the second quarter this year as compared with 69,624 tons in the same quarter in 1948.

The company is producing from the Hercules, Sherman Lead, Tamarack and Dayrock mines. At the Hercules a station is being cut on the 1,200-ft. level, from which point the vein will be explored by diamond drilling to further depths of 500 and 1,000 ft. At Sherman Lead a new crosscut is being driven from the 1,500-ft. level to explore vein systems in the Humming Bird and Mountain View properties adjoining. The crosscut will be 1,400 ft. in length. At the Tamarack mine the main shaft is being extended to an additional lepth of 300 ft. from which deep level the productive Watson vein will be explored.

The Day company is diamond drilling the Castle Rock property on Place Creek south of Wallace to about 500 ft. below prospect workings. The Castle Rock group is included in the Day company's Fern group, which will be prospected at a depth of 3,000 ft. as soon as the deep Galena shaft is completed.

★**The Bradley Mining Co.**, at Stibnite, Idaho, suffered a fire recently that destroyed $100,000 worth of mine buildings and other mining equipment including six ore bins, a big storage warehouse and loading ramps. The company operates the Yellow Pine antimony-gold mine at Stibnite where it has constructed a million dollar antimony smelter.

★Albert M. Nash, manager of the **Hope Silver-Lead Mining Co.**, at Clark Fork, Idaho, reports that the company has drifted on the Pearl vein on the 700-ft. level which shows the vein 8 ft. wide with streaks of high-grade ore on each wall and smaller streaks laced throughout the vein. Average assays shows 6% lead and 1.2 oz. silver per ton.

★**Spokane-Idaho Mining Co.**, operating on Pine Creek, has deepened its main shaft to the 1,400-ft. level and opening stones on the 1,200-ft. and 1,400-ft. levels, while plans are in progress to sink the shaft on down to the 2,000-ft. level. The company is equipped with a modern flotation plant and is producing 6 tons of lead concentrates and 25 tons of zinc concentrates daily.

★**Silver Bowl Mining Co.**, operating the old Senator Stewart mine at Kellogg, has opened a vein of high-grade lead-silver ore 100 ft. below the discovery tunnel level. The ore is said to be several feet wide.

IRON COUNTRY — Mather "B" shaft is completed.—More mines go to four-day week.

★**Haley-Young Mining Co.**, Hibbing, is drilling a property located near Fraser City, and the company's Elbern mine. The Elbern is shipping regularly, with 250,000 tons scheduled for the season. The mine's new crushing plant is in operation.

★Another old mine which has become active is the Ajax near Biwabik on the eastern Mesabi. It was stripped last year by **Skubic Bros.**, under lease from the **David Mining Co.**, and is producing this year. It is a shovel-truck operation with a small washing plant.

★The new Heavy-Media separation plant at the **Inter-State Iron Co.'s** Grant mine, is now in operation. The feed to the cone-shaped tank which contains the ferro-silicon, is from ⅛ in. to 1¼ in. in size. A good grade of product is made.

★E. W. Coons Co. is placing the concrete work for a large crushing plant at the **Oliver Iron Mining Co.'s** Sherman mine. About 3,000 yd. of concrete will be required. The Coons company is also loading ore at the Wyoming mine in Virginia, under contract for the Oliver. They previously completed a stripping contract at the mine.

★Groves, Lundin and Xoc Corp., contract firm of Minneapolis, have begun a 4,000,000-cu. yd. stripping contract for the Bennett mine of **Pickands, Mather & Co.** near Keewatin. Removal of this surface material will necessitate rerouting the Bennett mine road to Keewatin.

★Hill-Annex mine (**Inter-State Iron Co.**) plans for the 1949-50 winter include a large addition to their washing plant. This addition, together with the space now occupied by Units 1 and 2 of the present plant which are to be removed, will house a Heavy-Media unit. Western Knapp Engineering Co. is designing the new plant. It is expected to be in operation in the 1950 season.

★The Stevenson mine location, one of the oldest on the range, is being moved from the mine property. Some of the houses are being brought to the Hibbing area.

★First announcement as to results of polls being conducted in the Iron Country on the strike question, show 3,906 in favor of striking if necessary and 272 against.

★At Beacon, Mich., North Range Iron Mining Co. has a crew of men repairing No. 5 shaft of the Champion mine. No. 5 is 2,300 ft. deep and will be used to handle men and supplies, leaving No. 7 shaft for hoisting ore exclusively. High tonnage is being produced by the 70 men employed and all ore is being shipped to U. S. Steel Corp.

★With the exception of Mather "A" mine where the men took their vacations in July, all mines of the Cleveland Cliffs Iron Co. were idle while workers took their annual vacation of at least one week, starting Aug. 14. During the idle period, changes were made in operating equipment. At the Cambria mine, the 500-hp. motor on the main hoist was replaced with an 800-hp. motor. An 800-hp. motor at the Maas mine on the skip hoist

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One of a battery of three type H, multi-stage R-C Centrifugal Blowers; each direct-coupled to 700 HP motor; capacity of each blower is 15,000 CFM.
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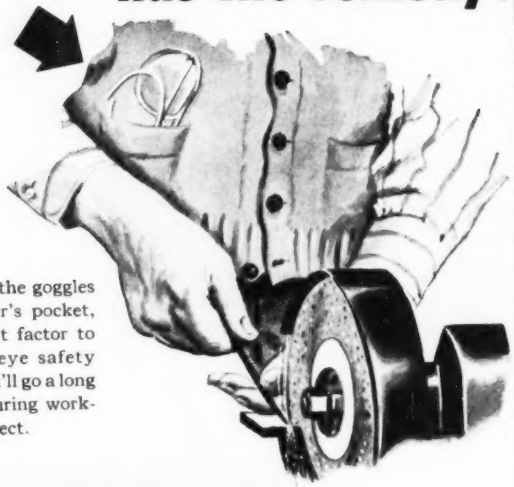
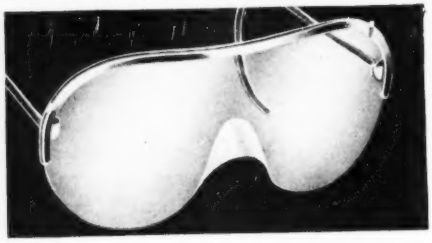


In order to get the goggles out of a worker's pocket, add the comfort factor to protection in eye safety equipment. You'll go a long way towards curing workers of such neglect.



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Here is comfort in nine-tenths of an ounce. WILLSON FeatherSpecs* with a large, overall plastic lens rest lightly on the nose and can be worn all day—even over prescription spectacles—without fatigue. Workers say they hardly know they are wearing any eye protection. Yet they prove adequate protection on many jobs such as light grinding, woodworking, spot welding and inspection of work in process.

If you want your investment in safety equipment to pay off—don't neglect comfort in your specifications.

DAILY REMINDERS

Daily reminders such as WILLSON "Blind Man" safety posters keep workers in hundreds of plants aware of the need for personal safety measures. Supplies are available on request.

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"Established 1870"

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Iron Country *(Continued)*

was replaced with a 1,000-hp. unit. Changes were not so much for larger production, but for smoother operation with d.c. equipment.

★**Cleveland Cliffs Iron Co.** is carrying on a diamond-drilling and trenching program at Humboldt in a deposit of low-grade iron ore. Acreage that the company is exploring was acquired from North Range Mining Co. who got it from the Breitung interests.

★The Vicar mine of **Jones & Laughlin Ore Co.**, at Wakefield, has installed a conveyor on the east side of its headframe to handle rock produced in underground development.

★**Cleveland Cliffs Iron Co.'s** new Mather "B" shaft at Ishpeming has been completed to a depth of 3,095 ft., a Marquette range record. Sinking was begun in October, 1947. It was greatly accelerated by the development of the Hydro-mucker which was used for much of the sinking. For the last 10 months, the rate of sinking was approximately 150 ft. per month.

After shaft stations and other preliminary work are completed, main level drifting will be started toward the Mather "A" shaft to meet a drift already being extended from that portion of the mine.

★Michigan mines are expected to ship most of their iron ore stockpiles before navigation closes to provide room for winter operations.

★A 5.5-in. rainfall within two hours fell in Marquette County July 28. It assured a winter water supply but caused considerable damage to highways, railroads, power lines and building foundations.

★Eighteen tons of dynamite were used by **Cleveland Cliffs Iron Co.** at its Tilden open pit mine at Ishpeming in August. Estimated breakage was 86,000 tons of siliceous iron ore.

★**M. A. Hanna Co.** reduced operations in the Iron River district from five to four days per week last July. **Pickands, Mather & Co.** continued its five-day program until Aug. 29 when it likewise reduced to four days. **Cleveland Cliffs** announced a reduction from five to four days at its Spies mine starting Sept. 5.

MICHIGAN

★**Calumet & Hecla Consolidated Copper Co.** re-opened its Michigan mines September 6, after several months of idleness. The company announced a 15% wage cut but expressed a willingness to consider a higher wage scale when the copper price reaches 19½c per lb. The union rejected a wage cut but voted to resume negotiations.

★During the first six months of this year, treatment of stamp sands at **Quincy Mining Co.'s** reclamation plant

at Mason, Torch Lake, continued in a profitable basis. The plant operated without interruption and handled 523,987 tons of sands with a copper recovery of 2,654,657 lb., an average of 5.07 lb. refined copper per ton. Tailings carried an average of 1.69 lb. per ton, which indicates satisfactory recovery.

MONTANA

★The Swansea flotation mill at the **Silver Bell mine** in the Stemples district, was destroyed in the forest fires north of Helena in the early part of August. The $100,000 mill was treating 75 tons of silver, lead and copper ore per day.

★Montana Industrial Accident Board has reduced its premium rate on underground mining from 10% to 7% of the monthly payroll on its state mutual plan. The new rate went into effect Sept. 1.

★High grade silver ore has been opened up in the King and Queen mines of the **Nancy Lee Mines, Inc.**, in Mineral County. The property is being operated under lease by E. G. Smith.

★**Ambassador Mines Corp.** is pushing a crosscut to its Wanda vein to tap it at a depth of 500 ft. below the surface where it shows good gold-silver-lead ore. The company is developing a group of 21 claims in the Trout Creek area, Sanders County.

NEVADA

★Expansion of operations by Basic Refractories to include mining and processing of magnesite as well as brucite at Gabbs, is now being carried out under the supervision of Norman E. Hanson, western manager for **Basic Refractories Co.**

★Sub-leases on the 13 claims of the **Tonopah Divide mine**, in the north end of Esmeralda county, continue to produce silver-gold ore. They have 320 tons in the bins and approximately 60 tons in the mine which they are holding to send to the Newmont mill in Goldfield as soon as the mill is prepared to take custom ore.

★There is considerable activity in the Rawhide district. **Rawhide Queen Co.** is milling 100 tons of ore daily. Charles Milland is operating an amalgamation and concentration plant at a rate of 35 tons per day. Minco gold washing plant is treating 250 cu. yds. of gravel every 24 hours.

★Last month 600 Nevada miners lost their jobs, putting the statewide employment situation in an unseasonable slump. Lowering markets and mounting production costs were blamed for the general setback.

★Resumption of diamond-drilling activities on Spruce Mountain, 40 miles

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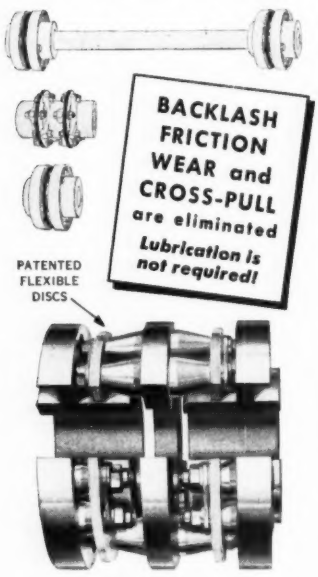

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TRACTOR AND CARRY-ALL remove overburden for open cut mining at Getchell Mine near Reno, Nevada. The mill is in Humboldt county.

Nevada *(Continued)*

south of Wells, was announced by H. H. Cazier, of **Nevada Monarch Mining Co.** which is doing the exploratory work.

NEW MEXICO

★A $250,000 onyx mining company has been incorporated at Albuquerque, to mine, quarry and prepare for market onyx and other stone. The quarry is located at Cave Creek, 95 mi. northeast of Phoenix. The company will be known as the **Rainbow Onyx Co.** F. L. Everhart, of Belen, will manage mining operations.

★Bert G. Clarke, of Littleton, Colo., has taken up sodium and salt mining leases in the vicinity of the Willard salt lakes in Torrance County. His company, the **Southwestern Chemical Co.**, plans to start operations this fall on production of a new type of fertilizer. Basic ingredients, company officials say, are salt and gypsite. Gypsite will be strip-mined from a depth of 12 ft. Shallow wells will be drilled in the lake bottoms to take liquid salt. Peter S. Litt, biochemist in charge, who developed the formula for the fertilizer, said that the salt and gypsite will be mixed in large vats and yeast added. The product, he said, is a "soil activator." Principal use, it is believed, will be on citrus orchard soils. Initially, the plant will employ 20 men.

★Mrs. Jean Hamilton, owner of the **Apache** group of mica claims in the Petaca district, northern New Mexico, is reported to be planning to erect a mill on the Apache No. 1 claim. It will process ores from the large mine dump of Apache No. 2 and also handle new ore from the two claims.

★It is reported that a new corporation, the **Socorro Corp.**, will reopen and operate the manganese mines just south of Socorro formerly operated by the **United Mining and Milling Corp.**

★The U. S. Geological Survey has assigned a hard-rock geologist to do detailed mapping of some of the more promising old mines in the Red River and Twining districts, northern New Mexico.

★Douglas B. White, an independent mining operator, of Silver City, is working the old **Hanover mine** in the Central district, Grant County.

★The New Mexico State Tax Commission shows a total valuation of all producing and non-producing mines in the state at $55,004,609. This is an increase of $7,122,749 over figures for 1948. Total assessments of all property in the state for 1949 amount to $531,910,245. Increase over 1948: $49,198,245.

NEW YORK

★Drilling by the Bureau of Mines has proved the lateral extension of the ore at depth from the old workings of the Shawangunk Lead-Zinc mine, also known as the Summitville mine, in Sullivan County, New York. In the investigation 24 holes were drilled totaling 6,526 ft., and 151 samples were cut from the vein in the old workings. Beneficiation tests are now being made on bulk samples of the ore at the Eastern Experiment Station of the Bureau of Mines.

OREGON — Pumice production prospects investigated.— More limonite shipped.

★Mineral rights on nine parcels of land, embracing 1,040 acres in an 8-mi. area in the vicinity of St. Helens, have been leased by the **Alcoa Mining Co.** with a view to developing laterite deposits.

★**Champion** mill in the Bohemian district of Lane County is treating custom ore from the **Musick mine** dump in addition to ore from the **Champion**

mine. Shipments of concentrates to Tacoma and Salt Lake have been made.

★Harold Barton of Eugene has leased a part of the **Helena mine** in Lane county and is engaged in mining heavy sulphide shipping ore for shipment to nearby mills.

★A rail tram has been constructed to transport ore from the main tunnel of the Hamlen copper prospect on Onion Mountain in Douglas County to a truck road for shipment to the Tacoma smelter. For the most part the ore consists of massive chalcopyrite, bornite and pyrite.

★A dragline outfit with dry-land washing plant is being installed by R. F. Oliphant and G. C. Pepperline at the Easterly mine in the Takilma area of Josephine County.

★**Northwest Aggregates** is currently producing 150 yd. of haydite per day at its plant on Sunset highway, 40 mi. west of Portland. The shale is expanded at the quarry and the finished product is trucked to Portland, where it is used by Empire Building Materials Co.

★**Smithwick Concrete Products Co.,** Portland, is building a $200,000 haydite plant to process material quarried 12 mi. south of Vernonia. Raw shale will be trucked to the plant for use as lightweight aggregate for cement block and monolithic construction. Production is expected to be 300 cu. yd. of haydite a day when full scale production is reached.

★The Oregon Department of Geology and Mineral Industry has completed an investigation into production of pumice in the state. Five active operations are under way in the Bend area, one at Burns and one at Chemult. A pumice plaster sand is being produced, a new feature of the pumice industry. Pumice aggregates are being produced in sized or segregated shape, or in some cases as a blend under carefully controlled production conditions.

★**East Eagle mine,** in northeastern Baker County, continuing development work this summer, uncovered copper as well as gold and silver. The ore is reported to contain both sulphide and native copper. A new road has been built which will make accessible intermediate tunnel levels where ore has been found. Rawleigh Chadwell is owner.

★Shipments of limonite have been sent from Scappose to British Columbia for use in removing sulphur from manufactured gas, according to the Ore.-Bin. James M. Orr, a Portland industrial minerals dealer, is reported to be operating a power shovel pit at the **Oregon Charcoal Iron** property, and constructing a plant at Scappoose for preparation of iron oxide as pigment, and as mineral addition to stock feeds. It is said that 700 tons of the pigment have recently been sent to a firm in California.

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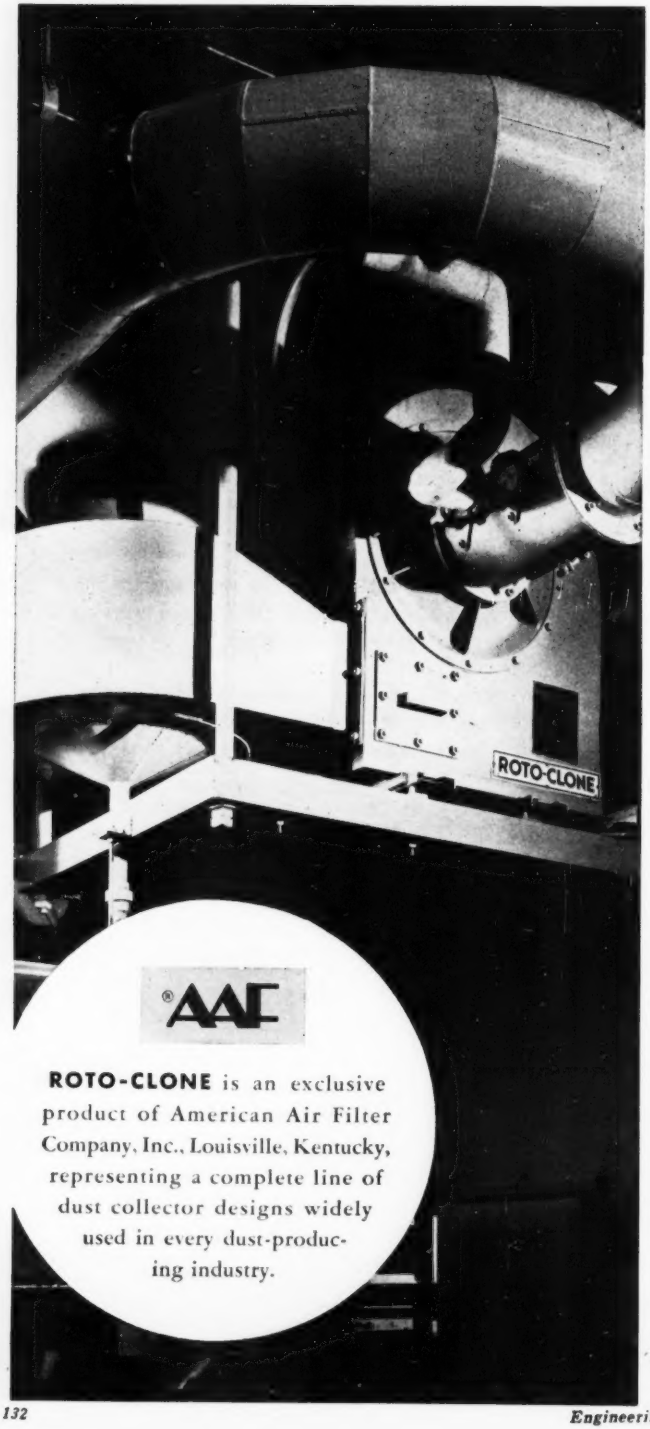
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— New Park resumes operation. ASARCO closes Murray smelter.

★First hopeful news in the Park City field picture in Utah came Aug. 24 when officials and union leaders of the **New Park Mining Co.** operation at Park City agreed to reopen the lead-zinc diggings.

Company officials and spokesmen for the CIO Progressive Metal Workers Council reported that New Park Mining Co. would resume operations at precisely the same pay scale in effect before its July 1 shutdown. Union members had previously sought increases, one factor in the shutdown which was brought about by the severe late spring drop in metals prices.

Representatives of the CIO union were scheduled to meet Aug. 31 with officials of **Silver King Consolidated Mines Co.** and **Park Utah Consolidated Mines Co.** in an effort to bring about a reopening of the other major Park City operations. Daniel Edwards, mediator and conciliator for the Utah Industrial Commission, expressed belief the recent metals price rise combined with apparent union willingness to resume work without pay hikes might bring about reopening of all major producers in the district before the end of September.

★**American Smelting and Refining Co.** announced plans to close its smelter at Murray, Utah, Oct. 1. General manager R. D. Bradford of the AS&R Utah Department said closure would be for "an indefinite period." He pointed out that the ore supply in recent years has been insufficient for continuous operation of the Murray smelter.

The shutdown will idle some 250 men. However, it is anticipated that perhaps 50 of the present crew will obtain employment at the new anode casting plant now under construction at Garfield, and at the big acid plant being erected by the **Garfield Chemical and Manufacturing Corp.** The former is an AS&R unit, the latter is jointly owned by AS&R and **Kennecott Copper Corp.**

Bradford pointed out that AS&R will continue to serve shippers and mines at other western smelters through its Salt Lake offices.

★Installation of structural steel has begun at **American Smelting and Refining Co.'s** anode casting plant at Garfield. The plant cost is estimated at $3,500,000. It will manufacture copper anodes for the new **Kennecott Copper Corp.** refinery close by and is expected to be in operation by late spring of 1950. The casting plant is being built by F. H. McGraw Co. and the American Bridge Co. As part of the construction problem, the smelter cooling pond adjoining a portion of the site was drained, with engineers reporting removal of some 10,000 cu. yd. of slime.

★Meantime, work is progressing on schedule at the $6,250,000 acid plant addition of the **Garfield Chemical and Manufacturing plant** at Garfield. The present plant capacity is 200 tons of 100% sulphuric acid. The new addition, in operation in late 1950, will boost capacity to 450 tons daily.

Being built by Leonard Construction Co. and the Monsanto Chemical Co. the Garfield addition will utilize Cottrell electric precipitators, flues and conversion equipment to convert smelter smoke gases presently wasted into useful sulphuric acid.

★**Chief Consolidated Mining Co.**, operating at Eureka, Utah, reported operating profits before depreciation of $212,572 for the initial six months of 1949 compared with $153,596 in the same period of the previous year.

Ore mined for the half year totaled 65,405 tons, productive of 1,096 oz. of gold; 409,205 oz. silver; 7,859,618 lbs. lead, and 8,648,890 lbs. zinc. Income from sales was $960,733 with expenses and tax provisions reported at $748,161.

TENNESSEE

★Federal Chemical Co. has purchased the phosphate mining rights to 11.11 acres in the Columbia area, on the Campbellsville Pike, for $10,000. The phosphate tract is part of a 75-acre property owned by Mr. and Mrs. George Chumbley.

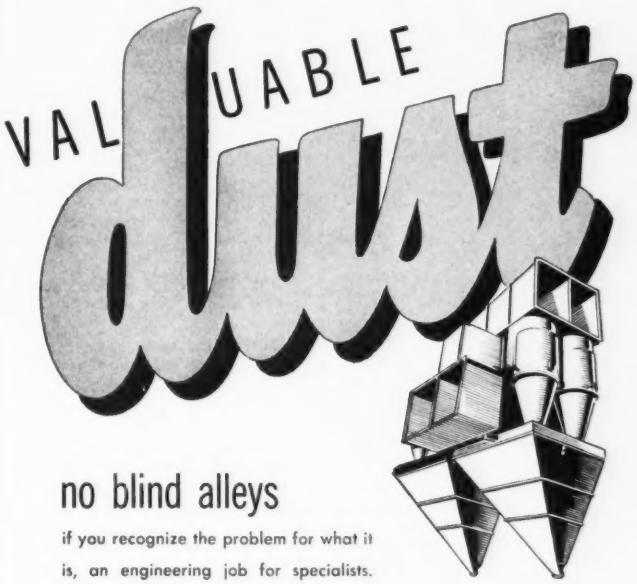
WASHINGTON — Strike ends at Metaline Falls. — Big Dome reports uranium ore.

★**Mines Management Inc.** continues development work at its Iroquois mine in northern Stevens County. It hauled about 4,000 tons of ore to Goldfield Consolidated Mines Co.,'s Sierra zinc mill where a six-week test run was to be made. After 3,000 ft. more of development at the mine, Mines Management expects to be able to decide the size and type milling plant to construct at the property.

★The 14-month old Grandview strike was ended at Metaline Falls Sept. 3, when members of Mine-Mill local 515 ratified a new contract with representatives of **American Lead, Zinc and Smelting Co.** About 150 miners resumed work Sept. 6. Wage differences between Metaline and the Coeur d'Alene districts were eliminated, representing an increase of 32c. per shift to the Metaline Falls miners. Other gains were a flat 2c. hourly wage increase and provision for six paid holidays a year.

★**Keokuk Electro-Metals Co.** which has used the Buckhorn mine in Okanogan County as a source of iron ore, has placed Ernest E. Eddy, Spokane mining engineer, in charge of explora-

The Straight-line Approach to Recovering



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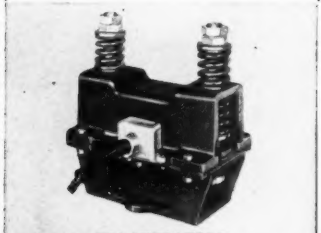

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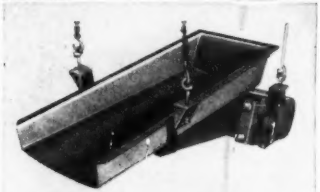

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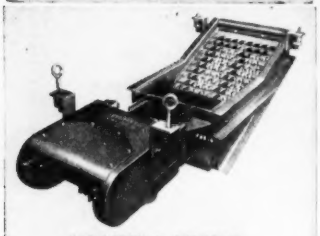

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Washington *(Continued)*

tion and sampling at the Kulzer iron mine near Valley.

★**Pacific Mutual Silver-Lead Co.** has recently installed about $4,000 worth of new equipment at its property near Kellar, according to C. A. Gray, manager. He reports the reopening of the main shaft, 250 ft. of crosscuts, raises and drifts, and about 15,000 ft. of surface bulldozing.

★E. H. Jamieson is manager of a Spokane syndicate which took a lease and option on the property of **Columbia Tungsten, Inc.**, in Huckleberry Mountains. The syndicate sent Henry Becker, former superintendent of the old Germania, to the new location to prepare a test shipment to be sent to **Tulare County Tungsten Mine's** custom mill in California.

★The state's lead production was 400 tons in June. Zinc production was 787 tons.

★**Gold King mine**, about three miles from Wenatchee, has shipped its tenth car of gold-bearing ore to the smelter at Tacoma.

★The proposed bill to return 818,000 acres of land to the Colville Indian Reservation, which caused much controversy in mining circles, is being amended to meet objections of mining interests, according to word received by Frank Funkhouser. Mineral rights acquired before 1934 will be protected and 25-year leases will be made instead of the 10-year leases. Northwest Mining Assn. has been assured by the Indian Bureau that it will work with mining men for a satisfactory mineral exploration program on the Colville Reservation.

★Preparatory to mining chrome ore near Nooksack, in Whatcom County, the **Nooksack Mining Co.** has begun construction of 2¾-mi. road to connect the property with the South Pass road. Chromium oxide has been assayed at 53.55% by the Pittsburgh Metallurigcal Co., which will be a customer for the ore, to be shipped by rail east to Niagara Falls, N. Y., or Charleston, S. C. The mining company's holdings include 490 acres on state land and 140 on government land, with seven 8-ft. lenses, overlapping so closely in some places that they can be worked as one lens. Original plans were for open-pit mining, to begin some time during the month of September.

★**The Big Dome Mining Co.** of Roslyn has discovered uranium-bearing ore on headwaters of the Yakima River in Kittitas County. The U. S. Bureau of Mines laboratory at Salt Lake City says the find is one of two, of thousands tested, that definitely contains uranium. The vein is located on Fortune Creek, 27 mi. above Roslyn, near Fish Lake, in an area 2,000 ft. long and from 300 to 600 ft. wide.

ICE SKATING RINK under construction will be given to the citizens of Trail, B. C., by Consolidated Mining & Smelting Co. Rink will have 2,500 capacity. Cost is estimated at $500,000.

CANADA—Slag fuming furnace starts at Trail.—Quebec mines ready to resume.

★Cost aid to Canada's gold mines in 1950 may be increased above $20 million if parity with the American dollar is maintained, according to Ottawa representatives of the mining industry. Bonuses paid this year by the government to gold producers are expected to be close to $15 million, a 50% increase over 1948. Any devaluation of British sterling is expected by the mining industry to result in shutting down more of Canada's gold producers and to further restrict the flow of U. S. speculative funds for mine development and exploration. The present international monetary crisis is viewed not only as a threat to producing gold mines but also as a

restraining factor that makes it impossible for more than 50 new mines to get into production.

The mining districts of northern Ontario and northwestern Quebec have been greatly benefited by the development of hydroelectric power from three new sources. Prospects are reported to be favorable for adequate hydro for next winter. The winter of 1950-1951 will see additional power available from the big new plant near Thessalon of the Ontario Hydro Commission, which is also completing important new plants on the Ottawa watershed. Storage basin facilities have been improved along the headwaters of the Ottawa River in northwestern Quebec. In northwestern Ontario, the Steep Rock and Michipicoten iron ore districts are expected to tax capacity of available power resources and to make necessary developing additional capacity for the Thunder Bay system.

MANITOBA

★**Hudson Bay Mining & Smelting Co. Ltd.** reports a profit of $6,854,688 for the six months ending June 30, 1949, against $7,591,950 in the corresponding period of 1948. Tonnage of ore handled in the first half of 1949 was 923,820 compared with 930,683 tons in the first half of 1948.

★**Sherritt Gordon Mines Ltd.** reports earnings for the three months ending June 30, 1949, as $256,843, as against $573,626 or 9.65c. per share for the first three months of this year. Earnings were sufficient to cover expenditures at Lynn Lake and to meet other exploration costs. Lynn Lake expenditures amounted to $225,262 while other exploration expenses were $30,784.

The outlook for the Lynn Lake orebody has improved materially since the end of the quarter. The latest flat hole drilled on the 9th level (775 ft.) gives an ore length of 205.5 ft. running 1.65% nickel, 0.79% copper. This increases the thickness of the 'A' orebody at this horizon. The first horizontal hole (No. 14) at the 7th level (500 ft.) cut 'A' orebody and from 183 to 305 ft. averaged 1.68% nickel to 0.83% copper. The hole was drilled due north. No. 18 has been started from the same setup directed 10 deg. to the west of No. 14. The latest report on the pilot plant operation shows 1.73 nickel and 0.83 copper for 280 tons of millfeed from the crosscut. Recoveries were up to 85% nickel and 88% copper.

★Diamond drilling on the No. 7 vein of **Jeep Gold Mines** has returned several good intersections. No. 82 cut 1.59 oz. across 0.5 ft. Hole 83 returned 4.12 oz. over one ft. and Hole 84 returned 0.88 oz. over one ft. A crosscut has started towards this new vein on the 200-ft. level.

San Norm Mines Ltd. reports that recent diamond drilling indicates a length of 400 ft. averaging $9.30 cut grade over 4.2 ft. at the 150 ft. horizon; at a depth of 300 ft., a length

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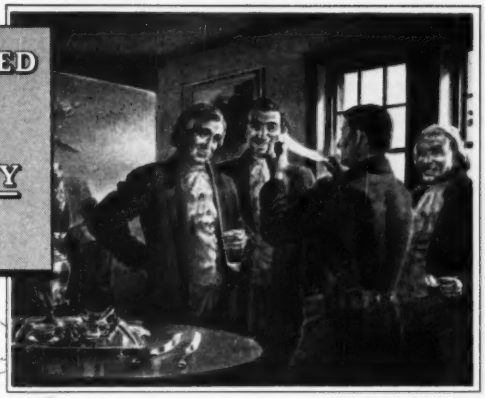

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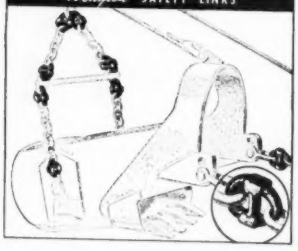

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Manitoba *(Continued)*

of 500 ft. averaging $5.60 across 5 ft.; at the 600 ft. horizon a length of 500 ft. averaging $8.40 across 2.8 and at the 1,000 ft. horizon a length of 250 ft. averaging $5.95 over 4.1 ft. J. F. Wright, consultant geologist, recommended a series of holes 1,500 ft. or more in length before commencement of underground work.

QUEBEC

★More than twenty-five mining properties in northwestern Quebec have announced plans for resuming underground work as soon as money can be made available, or pending more favorable developments in the international scene. Present high costs and the absence of speculative capital have blocked efforts of many companies to continue exploratory work. **Croinor Pershing Mines**, one of this group of partially developed properties in Quebec, has a 500-ft. shaft and ore reserves averaging $9.80 per ton in gold, adequate to operate a 300-ton mill for two years. This property was shut down last November.

★**Elder Mines** has been placed in a position to expand the rate of output to 12,000 tons monthly to meet anticipated smelter requirements for flux. Development work has been increased on the 800 and 1,000-ft. levels, where ore reserves have been considerably increased. The main No. 1 vein has disclosed widths up to 11 ft. on the 1,000 and 1,200-ft. levels. Several new vein structures have been discovered in the course of exploratory diamond drilling from surface. K. A. Roberts is president.

★**Ascot Metals Corp.**, having completed rehabilitation of the Moulton Hill mine in the Eastern Townships, is now undertaking a program of shaft sinking under the supervision of A. V. Corlett, professor of mining at Queen's University. The shaft is to be deepened to open three new levels below the three developed under previous owners. Plans have been announced for resuming production with the 250-ton mill after development has been completed down to the sixth level. Ore will be explored in the shaft area by means of diamond drilling while sinking operations are in progress. The company's treasury has received more that $100,000 and additional funds will be made available to bring the project to the production stage, according to present plans.

★**Eldona Gold Mines** has been carrying out drifting, crosscutting, and diamond drilling on the 1,150, 1,300, and 1,450 ft. levels in an attempt to test promising ore conditions indicated by deep drilling. Chamberlain Management Corp., consultants and general managers, report that tests made on a bulk ore sample have indicated that no metallurgical difficulties will be encountered when milling is started.

★**Donalda Mines**, located west of the

Eldona property, and adjoining east of Quemont and north of the Noranda mine, reports gold production for the first seven months at $367,376, including cost-aid. Ore is being drawn from stopes on the four levels developed down to 655 ft. Present production is at a daily rate of better than 225 tons, with ore reserves good for more than three years. Deep exploratory drilling from surface has disclosed encountering copper-zinc values in a section located 1,200 ft. north of the shaft.

★**Belleterre Quebec Mines**, McIntyre subsidiary, expects to have the new central shaft completed to 2,550 ft. by the end of this year. The first three of the seven new levels have been established. Plans for sinking a shaft on the No. 7 vein, south of the main orebodies, have been delayed until next year. The most important recent development on the property has been the discovery of a new vein located about 700 ft. south of the west main workings on the No. 12 vein system. The new ore was discovered by a series of six drill holes and is now being tested underground from a crosscut on the 250-ft. level.

ONTARIO

★**Canadian Johns-Manville Co.** has announced plans for starting production next May at the asbestos property located in Munro township, 12 miles east of the railroad at Natheson. When open-cut operations and milling are started the project will employ about 150 men. Mill capacity is to be 50 tons per hour. Three diamond drills are continuing the exploratory work that has been in progress for almost a year. The "A" orebody is reported to be 1,200 ft. in length, within a serpentine belt 400 ft. wide. The extensive serpentine formation is believed to be heavily drift-covered over much of its length in the adjoining Beatty and McCool townships, where sand hills and muskeg have made it difficult to put down exploratory drill holes.

★**Upper Canada Mines** has secured encouraging values from a drill hole put out to test a parallel vein structure on the adjoining Brock claims. The horizontal hole was drilled north from the 1,000-ft. level, disclosing $9.82 in gold per ton across a true width of 72.5 ft. Additional holes are planned to test this section and a 450-ft. crosscut is being put out from the No. 2 shaft on the 1,000-ft. level. The new values are believed to occur in a structure parallel to the "L" ore system, but no correlation has yet been possible with previous drill holes that were run out from the crosscut on the 1,750-ft. level.

YUKON

★Thure Gustavson is operating a placer on Moose Creek, a tributary

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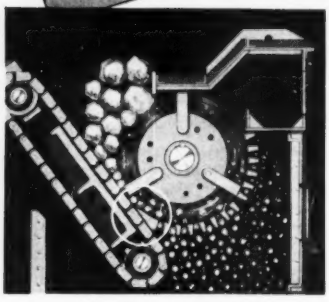

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Yukon *(Continued)*

of the Fortymile River. The property is near the Yukon-Alaska border.

★Anker Hoidahl is doing exploration work 75 miles east of the Firth River. He went in with Lon Philpott who is said to have made a rich strike on the Firth. Philpott is the first person to take thawing equipment into the district.

BRITISH COLUMBIA

★A new slag fuming furnace, installed at a cost of about $1,000,000, is in operation at **Consolidated Mining & Smelting Co. of Canada's** lead smelter at Trail.

The second of its type to be installed, it will handle lead blast, furnace slag at the rate of about 500 tons daily. The charge will contain about 17% zinc and 3% lead, these metal values being recovered first in the form of lead-zinc oxide dust and finally as refined metal after subsequent treatment in the zinc department and lead smelter and refinery. Although similar to the first unit, which was installed about 20 years ago, the new furnace incorporates more complete control by instrumentation, better coal feeding and water-cooling, and more efficient recovery of heat from furnace gases.

★**Lucky Jim Zincton** mine is operating at full capacity and diamond drilling on upper levels in the region worked by a predecessor have been very satisfactory to date, Henry E. Doelle, managing-director, told the annual meeting in Vancouver. New depth is being gained by extending the incline tunnel below the 10th level, the source of the best ore mined. At the **Sheep Creek** gold mine, where ore is being broken for resumption of milling, a raise from the 9th level has located ore in the 57 vein 200 ft. below an orebody which in the 7th level averaged .04 oz. gold per ton for a length of 230 ft. A. E. Jukes, president, said the company planned to resume work at the Congress Gold Mine, Bridge River, this fall.

★Preparation for production from the north orebody at the **Vancouver Island Base Metals** property, at Mt. Sicker, near Duncan, are continuing. **Chamberlin Management Corp.,** in charge of operations, reports recent diamond drilling on the Magic Fraction, lying between the Richard III and Tye sections, has indicated the extension of the south orebody and returned 5 ft. averaging 0.38 oz. gold; 5.4 oz. silver; 4.25% copper; 0.75% lead and 7.2% zinc per ton. Possibilities for developing new good grade tonnage are reported encouraging. Dewatering of the main shaft is continuing below 1,150 ft. with preliminary examinations of the 1,000- and 1,150-ft. levels showing considerable chalocopyrite in green schist.

★At the **Cork Province mine** near Kaslo high-grade ore has been developed in the west drift on the fifth or lowest level on the extension of a previously developed ore length of 55 ft. which averaged 6.8 oz. silver; 9.99% lead and 13.5% zinc across 2.5 ft. The drift was advanced in ore a further 60 ft. with channel sampling of the first 43.5 ft. averaging 11.4 oz. silver; 15.3% lead and 26.5% zinc, across a width of 4.8 ft. The vein has shown widths up to 7 ft., with a continuous high-grade length of 115 ft. now proven. According to Chamberlin Management Corp., in charge of operations, indications are the ore will extend well above and below the ore length. On the fourth level an ore length of 98 ft. has been developed, averaging 2.8 oz. silver; 2.8% lead and 11.4% zinc across 5 ft. This ore is now being mined with similar ore from the previously developed zinc stope. Shipments average 50 tons daily.

★Recent increases in base prices are being reflected in earnings of **Base Metals Mining Corp.** from its property near Field, with net operating profits in July estimated at over $30,000. Profit for August was expected to show a further substantial improvement. In July the mill treated 4,300 tons of ore averaging 8.01% lead and 6.13% zinc. Production was 385 tons lead concentrates averaging 54.26% zinc and 5.56% lead.

Ore reserves are being maintained with development starting in new areas in which promising showing of good grade lead ore have been obtained in the East Monarch Mine. New equipment is being added, including an additional mucking machine, rock drills, mine cars, etc., and a 550-ft. cross-cut is to be driven from the 175 D-cross-cut to surface. This will open new ground and improve ventilation, permitting two shifts daily.

★**Hedley Mascot Gold Mines., Ltd.,** is arranging for an improved power supply for its optioned Sunloch and Gabbro properties, near Jordan River, south end of Vancouver Island, following favorable results in diamond drilling. The present gas-driven compressor is being replaced by an electrically-driven compressor which will be set up close to the Jordan River hydro power plant of B. C. Electric Co., according to Dr. Victor Dolmage, consulting geologist, the company should be able to make definite plans for operation before the end of the coming winter. Working two diamond drills two shifts daily, favorable results have been gained in three separate projects. Downward extension of the main Sunloch orebody has been proven for between 300 and 400 ft. below the river tunnel. In two further drilling projects to prove more ore above the river level, the first sought downward extension of good surface showings on Babbro claims across the river and downstream, but the hole was lost before the objective was reached; and the second under another showing cut 3 ft. of 3.16%

copper at depth of 50 to 60 ft. The third project consisted in drilling from the surface to test 20 to 300 ft. of ground above the main Sunloch orebody.

★New silver-lead ore has been discovered on Adams Plateau, near Kamloops, about 1½ mi. northwest of the campsite on the Mosquite King property currently under investigation by **Consolidated Mining & Smelting Co. of Canada.**

The new discovery was made by Pat Bischoff, prospector for I. W. C. Solloway & Associates, the group which optioned the Mosquite King to CM&S. Bischoff reports the ore to be 14 ft. wide and traceable for a length of 3,000 ft., and judging from appearance, may run higher both in silver and lead than that found to date on the Mosquite King property. The Solloway interests have arranged for an immediate examination by B. W. W. McDougal, consulting engineer. The new ore was discovered on a group of 31 claims staked by the Solloway interests in July.

★The new 100-ft. level at the Copperado property of **Guichon Mines, Ltd.,** Nicola district, has to date opened a total of over 50 ft. on the richly mineralized fissure, reports Alfred R. Allen, managing director. Where exposed by recent work the fissure is from 4 to 8 ft. wide and the drift northerly on the new level has opened high-grade copper mineralization similar to that encountered directly above on the 50-ft. level. About 200 ft. of additional sinking is planned. A parallel mineralization zone, indicated by exploratory work, will be diamond drilled at a later date. James D. Ferguson, mine manager, reports that drifting on the 100-ft. level is in a full face of high-grade copper, gold and silver ore. The north drift continues in high-grade ore with both walls spreading outwards toward the bottom of the drift. On the Copperado, diamond drilling has reportedly indicated continuance of the strong shear zone for at least 225 ft. lower than the present shaft bottom and recent information indicates a parallel mineralization zone to the northeast which could be explored from shaft workings.

★Production of **Island Mountain Mines Co., Ltd.,** Wells, for July, was 3,743 tons milled, for a recovery of 1,645.42 fine oz. gold.

★**Ainsmore Consolidated Mines, Ltd.,** operating Kootenay Florence Mine, north of Ainsworth, reports output for 1948 was 13,661 tons milled, for a recovery of 15,432 oz. silver, 627,882 lb. of lead, 408,347 lb. of zinc and 2,201 lb. of cadmium.

★**Canam Mining Corp.,** which has registered with the U. S. Securities & Exchange Commission a proposal to sell 1,000,000 shares of no par value common stock in the U. S., plans to explore a large mineralized area on the Hope-Princeton highway, some

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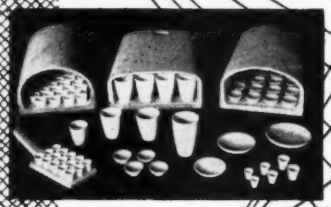

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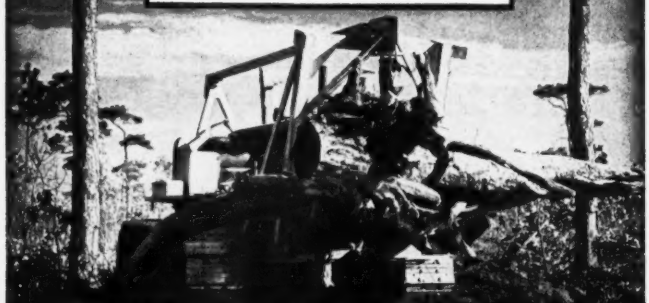

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British Columbia *(Continued)*

125 mi. northeast of Vancouver. G. Alan MacPherson, Vancouver, a company advisor, reports copper in a vein 100 ft. wide of medium to low grade, "but a very good grade for a large operation," is indicated on properties lying between mile 22 and mile 28 east on the highway. Properties consist of two areas, one formerly held by Skagit River Development Co., and a second taken over from Consolidated Mining & Smelting Co., with CM&S retaining an interest.

★Exploration by **Western Uranium Cobalt Mines, Ltd.**, has resulted in reports that the company may have one of the most interesting uranium prospects currently under investigation in Canada. Previously developed for its gold and cobalt content, the property, near New Hazelton, has surface cuts and four deep tunnels which expedited preliminary examination. In addition to values in gold and cobalt, presence of uranium has been proven both by Geiger counter and by assay in amounts sufficient to confirm the best hopes for the property. Besides values in the main vein on the surface and in the lowest tunnel 700 ft. below the surface, values have been located in a parallel vein, which to date has been stripped for 350 ft., with the first sample averaging 1.52 oz. gold and 1.83% uranium oxide across 12 in., with cobalt values still to be determined. Confirmation of values in the main vein followed trenching and re-conditioning of the old workings. This vein extends up and over the crest of Rocher de Boule mountain for a length of 1,050 ft. To date information is available on 15 samples which averaged 1.92 oz. gold per ton; 121 samples which averaged 0.83% uranium oxide; and on 11 samples which averaged 1.41% in cobalt. About half the 21 uranium samples were taken without aid of Geiger counter.

★A former silver-lead-zinc producer, the **Alice mine**, on Goat Mountain near Creston, is undergoing preliminary investigation by R. B. Staples and associates. Mr. Staples is directing a limited program to recondition old workings.

★Preparation of the Jackson mine in the Slocan district for immediate extraction of zinc ore, said to assay 30% or better, is under way. The Jackson mine, previously an important lead-zinc producer 5 mi. west of Retallack, north of Kaslo, has been acquired on option by Edward G. Brown of Vancouver. Reported high-grade silver-lead ore in the Jackson shaft will be investigated later. Mr. Brown has been negotiating with **Retallack Mines, Ltd.**, for treatment of zinc ore at the Whitewater mill.

★The suction dredge of the recently-organized **Tulameen Dredging Co.** is expected to get into early operation on 6 mi. of placer leases extending up the Tulameen River from the CPR

bridge at Princeton. The dredge has an 8-in. suction point and a rated capacity of 100 cu. yd. per hour.

Dragline dredging operation of **Atkinson Dredging Co.** has entered an extensive section of pay dirt in its course upstream on the Similkameen River below Princeton. Test logs have indicated average values of 42 cents per cu. yd. Existence of the deposit has been known for some time, but necessity of dredging lower grade alluvials to reach it so far has deterred dredging experts.

★**Kelowna Exploration Co., Ltd.,** produced from its Nickel Plate operations at Hedley during 1948, 42,397 oz. gold, 3,155 oz. silver and 94,286 lb. copper from 115,556 tons of ore milled. Development work consisted of 3,358 ft. of drifting, crosscutting and raising. Of this 1,444 ft. was done in exploration, with work being about equally divided between the 400, 800 and 4,150-ft. levels. The remaining 2,104 ft. of development work was done in stope preparation. Tonnage of ore trammed from the mine was maintained at a rate of 415 tons daily.

Customs ore shipments to **Consolidated Mining & Smelting Co.'s** Trail smelter in the four-week period ending Aug. 20 totaled 10,911 tons, compared with 12,631 tons in the previous period, with 7,256 tons lead and 3,655 tons zinc. This compared with 6,776 tons lead and 5,855 tons zinc in the previous period.

NORTHWEST TERRITORIES

★Officials of the mines division of **Consolidated Mining & Smelting Co. of Canada, Ltd.,** report that results of preliminary diamond drilling on the 2,300-ft. level of the Campbell shear at their Yellowknife operations indicate the possibility of a new large orebody in the vicinity of the Con-Rycon boundary line. Average ore grade from drill results so far is considerably lower than mine average but the deposit may prove of such size as to be economic.

★**Consolidated Astoria Mines, Ltd.,** reports diamond drilling is starting on the company's 750-acre property adjoining on the east and the south the B.B. groups of claims being explored by Hellinger Exploration, Noranda Mines and Mining Corp. in the Indian Mountain Lake Area north of Great Slave Lake. Drilling follows recommendations by Geo-Technical Development Co. after completion of geophysical and geological survey which indicated a number of areas had possibilities for base metal deposits. These areas lie in the altered sedimentary formation of the same type as that in which high-grade lead-zinc-silver ore is found on the adjoining property. First drilling will be done on a promising anomaly in the southeast section of the property, where previous drilling indicated favorable geological and structural conditions

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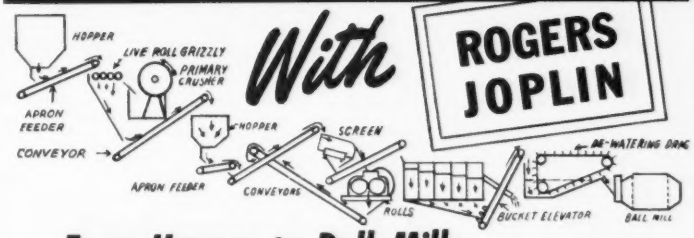

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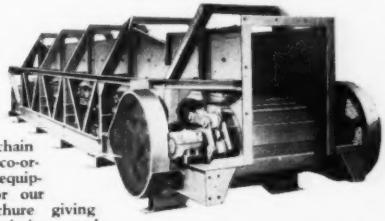

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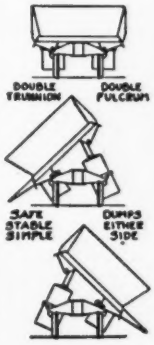

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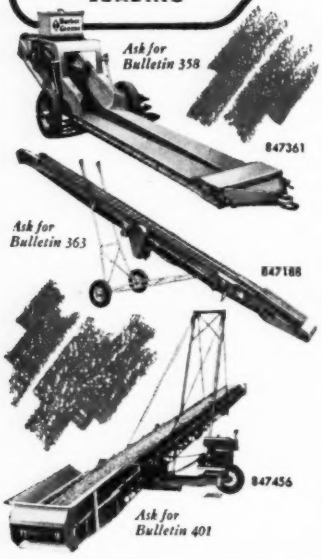

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Northwest Territories *(Continued)*

and returned considerable mineralization across good widths with encouraging values in zinc.

★**El Pen-Rey Mines, Ltd.** reports preliminary exploration has been completed on the company's six groups of claims, totaling 5,000 acres, in the Indian Mountain Lake, Basile bay and McRea Lake areas. Further exploration is being held in abeyance pending developments on these properties.

MEXICO—Copper operators ask tax reduction.—Silver sales are high.

★Increased silver production in Mexico is credited by the Bank of Mexico as a direct result of large-scale sales the Bank is making abroad. During the first eight months of 1949 it had obtained about $27,277,250 (U. S.) from the export of 38,150,000 fine oz. of silver. Saudi Arabia was the top customer. Reserves of silver accumulated by the Bank in recent years from the mines in Mexico, are now nearly exhausted. The Bank sees more business abroad for Mexican silver in U. S. industry and for coinage in Far and Near East countries.

★Mining is still generally depressed despite the new high foreign exchange rate of 8.65 pesos per dollar. Many operators are considering stopping work until conditions improve.

★Mexican copper companies joined together and issued a statement telling the Mexican government that they will have to shut down their operations if the current 12% production tax and the 15% export tax are not reduced.

It is reported that one of the largest operations, **Moctezuma**, has already been halted for this reason. In addition to Moctezuma, companies joining in issuing the statement were **Cananea Consolidated**, the French-owned **El Boleo**, **Mazapil**, and **Minerales de Chihuahua**.

They said that the Mexican copper mining concerns have to work with ore with four times the mineral content of that handled by U. S. producers to break even. Cananea, for instance, is said to have been specifically designed to work low-grade ore, but it cannot compete with U. S. companies in face of both the production and export tax.

The statement said that "seven-tenths per cent copper not only pays but is sufficient to induce miners to undertake further exploration work in the United States, but that Moctezuma, which shut down last May, has abundant reserves of 2.7% ore which could not be mined under present Mexican conditions without loss."

The decline of the world price has further aggravated the plight of the Mexican copper mining concerns, although revaluation of the peso had at least a temporary alleviating effect.

★The law for exploiting Mexico's sulphur resources has been changed to conform with the many advances made in the mining of this element.

Sulphur mining permits will come under the present Mexican mining laws with the exception that permits will only be extended for 20 years rather than the 99 years extended previously. No concession will be given for an area larger than 1,000 hectares (about 3,000 acres).

★The law instituted last December under which "subsidies" were to be given to mines turning out relatively small amounts of ore appears to be working and new rates of subsidy have been announced by the Mexican government. Under this law, a silver mine, for instance, turning out less than 50 tons of ore would get a rebate on its production tax of 80% of 17 pesos per kilo tax of fine silver, a mine turning out 150 to 250 tons of ore, for instance, would get 30% of the tax back.

The only noticeable effect, according to mining men, has been to keep a number of small mines going that would otherwise have had to shut down. The system is so complicated that it hardly seems worth the effort on the part of the government.

BOLIVIA

★Tin production is expected to be 20% less in 1949 than the 1948 total of 37,935 metric tons. With civil war, strikes, higher railroad freight charges, increased taxes and new labor demands it is surprising that production may be that high. **Patiño Mines & Ent. Cons.** were especially hard hit.

The civil war which broke out last month was the climax of a long period of political unrest. People are confident that Government forces will win a complete victory within a few weeks. Once hostilities are ended, mining and other businesses can expect to show some improvement.

★Against the general trend, the San Jose property of **Cia. Minera de Oruro** which was leased to the government, has been increasing its production. It is felt that the improvement is mainly due to organizing the work on a bonus basis rather than on fixed wages, and to fewer restrictions by the government. In successive six-month periods, starting the first of 1948, average monthly output increased from 173 tons to 207 tons to 212 tons this year.

★The Bolivian Tin Committee has met to discuss the instructions to be given to delegates who will meet in Washington this year with the representatives of the Reconstruction Finance Corporation. They will negotiate a new contract for the sale of Bolivian tin. The present contract expires Dec. 1, 1949.

CHILE—Paipote smelter construction progresses.—Romeral iron is readied.

★Construction of the **Paipote Copper Smelter** is progressing favorably. Most of the construction machinery and structural steel has already arrived in Chile.

It is expected that the rest of the machinery for the smelter and the electrical equipment will arrive in the country before January, 1950. About 700 men are employed in construction. The smelter should be fired in early in 1951. Paipote is also going over some of the most likely and nearest deposits of lime and pyritic fluxes of which there is danger of a possible shortage. The smelter has recently organized its own mining and geological departments which will take care of all work connected with supplying such fluxes or copper concentrates that it may lack occasionally.

As Caldera will be the port through which ores, concentrates, coal and blister copper will be handled, the Government has decided to reinforce the mole and bids are being asked for that purpose. The railroad between Copiapó and Caldera, which is 56 miles long, needs reinforcing and a change of rails.

★As the price of gold continues high, much developed work is being done in the **Inca de Oro** and **Isla** camps where gold veins are plentiful and fairly high grade though narrow.

Under present conditions it is of great economic importance to find deposits whose gold can be cyanided or amalgamated and turned into gold bars for conversion by the Mint into gold coins which can be auctioned at the Stock Exchanges. Gold in coins is worth four times as much as gold which must be exported in ores or concentrates and sold in the U. S.

★The **Sherwin Kelly Geophysical Co.** has been doing surveys for the lead and zinc mines of the **Aysen Mining Co.** in southern Chile and for the **Punitaqui Co.** near Ovalle in northern Chile. The spontaneous polarization, magnetic and electric resistivity methods have been used.

The same company has undertaken to do geophysical work for Paipote at the **Carrizal Alto** and **Ojancos** copper camps in Atacama. These geophysical surveys are the first to be undertaken in Chile by modern methods and apparatus on non-ferrous ore deposits.

★Andacollo gold camp is going through another great boom. About 70 Chilean mills are grinding, amalgamating and cyaniding 300 tons a day of low-grade ores with a production of 1,900 oz. of fine gold a month valued at around 10 million gold pesos. **Caja de Credito Minero** is putting up another 440-hp. Baldwin diesel to take care of the greater demand for power. Though the grade of the ore is low, about 0.1 oz. per ton, the mineralized

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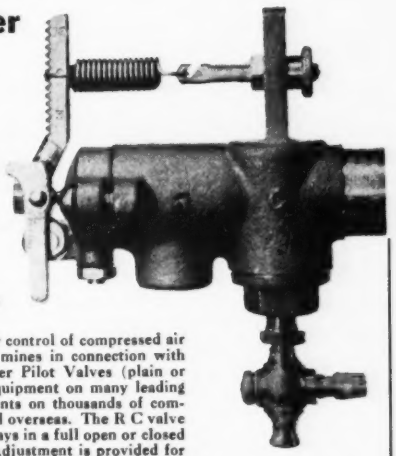

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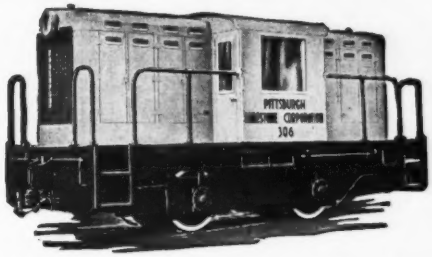

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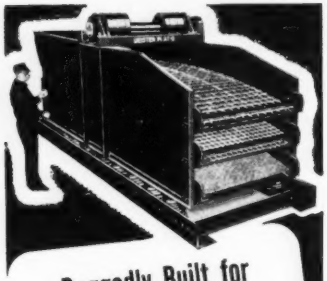

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Chile *(Continued)*

beds are large and mining is very cheap. Water for milling was scarce until the recent heavy rains. All water for drinking and milling must be pumped through shallow shafts as the water-table is not deep.

★**Compania Minera y Comercial Sali Hoshschild** has increased the capacity of its gold cyanide mill at Copiapo from 30 to 70 tons a day. This is a custom plant which buys its ores from mines located near Copiapo, Vallenar, Inca de Oro, Isla and other nearby camps. Previously this mill used to treat gold ores that contained soluble copper by leaching such copper out with sulphuric acid, but because of a shortage of acid straight cyanidation ores are now being treated.

★The Chilean Bureau of Mines has been investigating the apatite reserves of Chile. Apatite is found in Chile along the Coast Range and the Longitudinal Valley, closely associated with the granodiorite batholiths with which are also associated the iron deposits. Apatite reserves if not sufficient for export are adequate for the needs of the country for many years. A great proportion of them are low-grade and need concentration by flotation.

★The Romeral deposit belonging to **Bethlehem Chile Iron Mines** which will replace El Tofo as a source of high-grade ore when that is exhausted, is having the necessary engineering work done previous to developing the property and building the railroad and wharf at Guayacan.

★**Cia. Minera Punitaqui**, largest individual gold producer in Chile, has completed its cyanide section to mill 300 tons of ore a day.

★**Cia. Delirio de Punitaqui** which is working the same large vein to the south of Minera de Punitaqui is designing a 70-ton-a-day cyanide mill to treat its oxidized ores. The ores of the secondary zone carry about 3.5% copper and 0.13 oz. gold and will require flotation.

AUSTRALASIA—Tennant Creek field is active.—Malayan tin output is reported.

★Opposing demands for an increase in the official gold purchase price or for unqualified subsidies to the mining industry, Prime Minister Joseph B. Chifley said that the Commonwealth government could not make any decisions on gold at present. The question would be discussed at the September meeting of the International Monetary Fund, of which Australia is a member. Australia had no voice in the price of gold. This was determined solely by the United States, the only unlimited purchaser of gold in the world.

WESTERN AUSTRALIA

★Western Australia gold output for the first six months of 1949 totaled 329,809 oz., compared with 300,864 oz. for the first half of 1948.

★Rising industrial consumption of gold is decried by the Kalgoorlie Chamber of Mines in a statement which says that it is unfair that at the producers' expense industrial users are getting the metal at the 1944 price. In the four years from 1942 to 1946, industrial consumption of gold in the United States increased from 1,351,280 oz. to 4,391,057 oz. The Chamber did not disclose how much gold is processed industrially in Australia.

The International Monetary Fund seemed very anxious that South Africa should desist from establishing a separate market for industrial gold, but the efficiency of America's own control of gold disposal could be questioned, says the Chamber. Big industrial consumption of gold also contradicts the claim that, given a free market, the demand for gold would soon be satisfied, the statement continued. While there is little argument that gold prices must be fixed because of the danger of inflation, there is no excuse for giving it cheaply to industrial users. If they continued to do so, U. S. authorities would seem to be conniving at a "racket."

★**Linden (W. A.) Gold N. L.** has suspended work temporarily because of unpayable values.

★Net profit of **Great Boulder Proprietary Gold Mines N. L.** for 1948 was £41,596, compared with £43,695 in 1947. Treating 368,193 tons, the mine produced 83,422 oz. Ore reserves were estimated at 2,350,035 tons, of an average grade of 5½ dwt. a ton.

★After writing off flotation and establishment expenditures, **Mountain View Gold N. L.** reported a net profit of £30,028 for the first fifteen months of operation. Mountain View works a rich shoot at Day Dawn, near Cue. In the period under review 1,112 tons of ore yielded 5,503 oz. by amalgamation.

★After providing £10,000 stg. for depreciation and £10,930 stg. for taxation, **Gold Mines of Kalgoorlie Ltd.** earned £45,013 stg. for the year ended March 31.

★A deposit of high-grade hematite ore, estimated at 250,000 tons, has been discovered near Northam, about 60 miles east of Perth. The quality of the ore is claimed to be equal to that of the rich deposits on Koolan Island, in the Yampi Sound. The discovery will enable the nearby charcoal iron plant at Wundowie to produce low-phosphorus iron. The plant now draws on a nearby limonite quarry.

NORTHERN TERRITORY

★Growing prospecting and mining activity in the Territory promises to

rival livestock breeding as a major industry. The Tennant Creek field is buzzing with activity, with the support of gold-mining interests in Adelaide, Sydney and Melbourne. **Australian Development N. L.** has developed ore for many years' crushing at the present battery capacity of 1,000 tons a month. High values have been reported from an enrichment below the 135-ft. level. It has been decided to sink three new winzes below the level and to deepen the main shaft to 200 ft., so that the ore disclosed in the winzes and other developmental exposures may be more economically handled.

Keen interest is reported in gold and tin ore occurrences in the Katherine, Pine Creek and Maranoby districts, to the north of Tennant Creek. Work is continuing at the Home of Bullion mine, at Barrow Creek, about 200 miles north of Alice Springs. High-grade oxidized copper ore now being won as part of the exploratory work is hauled from Alice Springs to Port Kembla smelting.

SOUTH AUSTRALIA

★The strike at the **Iron Knob** which began last March was settled on June 29, but this was followed by a seven-week coal strike and the closing down of blast furnaces, leaving the iron ore quarries without an outlet.

★**Broken Hill Associated Smelters Pty. Ltd.**, Port Pirie, resumed operations late in August after closing down due to the coal strike.

TASMANIA

★Conditions in Tasmanian metal mines are better than those in Victoria, according to Dr. W. D. Robson, chief medical director of the McIntyre Research Foundation, Toronto. Dr. Robson visited Australia to advise mines departments and health authorities on the use of aluminum therapy in the fight against silicosis. He recommended its use in Tasmanian underground mines in conjunction with the ventilation and health standards adopted by Tasmanian companies and policed by inspectors of the Mines Department.

NEW SOUTH WALES

★The Barrier mining companies own and operate an airline, Silver City Airways (Australia) Pty. Ltd., for the movement of personnel and equipment to inaccessible exploration areas. Using aircraft equipped with aerial magnetometer, Silver City Airways conducted a survey of the inland regions of Australia.

★**New Broken Hill Consolidated Ltd.** produced 103,578 tons of ore from its own leases in 1948, compared with 62,367 tons in 1947. A large proportion of the production was still being drawn from the more readily accessible zinc lode orebodies at and above

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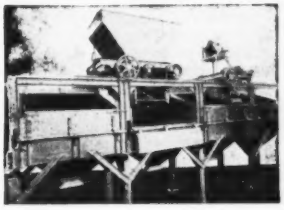

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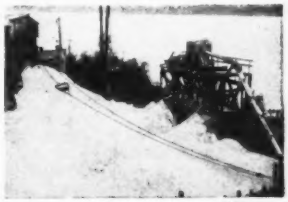

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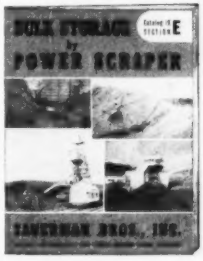

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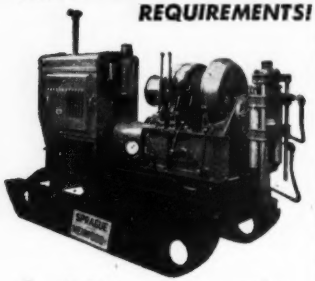

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New South Wales *(Continued)*

the No. 16 level, but further development has been directed to the lower levels where the lead lodes enter the leases.

At the end of last year New Broken Hill employed 511 mine workers. A special training scheme for underground workers is in operation, with fourteen company employees engaged as instructors.

The three-year agreement covering the conditions of employment of all mine and surface workers at Broken Hill expired in July and negotiations for a new agreement have started under none too happy auspices. A stoppage along the entire Broken Hill line of lode is threatened as a result of the workers' decision to hold a "stop-work" meeting each Wednesday until the Mine Managers' Association gives a satisfactory reply to their ten claims.

Mr. G. R. Fisher, the association's chairman, told union delegates that the mining companies were not prepared to operate on a four-day week which the unions intended under their Wednesday stoppage plan.

At the bottom of the miners' claims is the reluctance to realize that the substantial lead bonuses which the Broken Hill mines have been paying are not a regular part of the wage. On present lead prices, the men are already receiving about $10 a week too much in their weekly pay envelopes. The basic figure for payment of the bonus had been reduced as costs fell from £35 stg. a ton to £16 Australian, but when costs rose it had remained at this figure. Higher costs, coupled with lower world market prices, are spelling the end of the era in which Broken Hill was the city with the highest per capita income in Australia.

QUEENSLAND

★Queensland's gold production for June was 6,389 oz., a decline of 319 oz. from the same month a year earlier. Mount Morgan is by far the biggest producer with approximately 79% of the total.

★For use in steelhardening at Newcastle, the **Broken Hill Pty. Co. Ltd.** has contracted for 2,000 tons of Queensland manganese at a cost of £10 a ton. The ore comes from Imbil, about 40 miles south of Maryborough. It is said to be of high grade and although occurrences of manganese are usually sporadic in Queensland, reports indicate that substantial quantities will be available from this area.

★Mount Morgan's production for the year ended June 30 showed a sharp increase over the preceding twelve-month period. Gold output rose from 44,180 oz. to 58,663 oz. and copper from 2,756 tons to 3,523 tons. Although the Australian copper price has been raised by £20 a ton, the gold content of the Mount Morgan ore exceeds the value of copper. Taxwise the mine and its shareholders are therefore enjoying the special concessions which apply to gold mines.

★**Tableland Tin Dredging N. L.** cleared a net profit of £101,976 in the year ended June 30, 1948, compared with £66,938 a year earlier. In the same period **Sugarloaf Tin N. L.** reported a loss of £787.

NEW ZEALAND

★Preparations are in progress to open a lead mine, the first in the dominion, at Te Aroha, 100 miles south of Auckland. Operations are not expected to get under way before 1951.

★**Alluvial Gold (Oceania) Ltd.**, operating in conjunction with **Gold Exploration and Finance Co. of Australia Ltd.**, has abandoned an option over a gold-bearing area on the west coast of the South Island because of the decline in New Zealand gold price from 6¼ shillings to 5 shillings per 1/35th ounce.

NEW GUINEA

★**Yonki Creek Gold N. L.** has been formed to acquire from **Gold Prospecting and Development N. L.** an option on the Yonki and Ornapinka Creeks, in the Kainantu district.

★**Sunshine Gold Development Ltd.** has entered into an agreement with **Bulolo Gold Dredging Ltd.** under which Sunshine will work a portion of the Widubosh Terrace in the Bulolo lease. Net proceeds will be shared by the two companies.

SIAM

★**Takuapa Valley Tin Dredging N. L.** realized a net profit of £39,091 in 1948 and obtained, in addition, £37,659 from the Siamese government in part settlement of war damage claims. The No. 1 dredge, working for 6,324 hours, dug, 1,395,000 yards for a return of 153.83 tons of tin ore (74.3%). Rehabilitation of the working was nearly completed at the end of the report period.

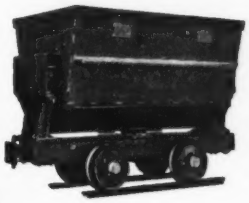
No. 2 dredge, operating for 6,093 hours, returned 258.44 tons (73.85%).

MALAYA

★Outputs of tin-ore concentrates for companies under the management of Anglo-Oriental (Malaya) Ltd. in July were:

Ampat, 82 tons; Batu Selangor, 18¼ tons; Berjuntai, 63¾ tons; Jelapang, 10¼ tons; Kamunting (including Siam), 148¼ tons; Klang River, 17 tons; Kramat, 48¾ tons; Kuala Kampar, 78 tons; Kuchai, 13 tons; Larut, 57¾ tons; Lower Perak, 220¼ tons; Rawang Concessions Ltd. (sluicing plant only), 24¼ tons; Rawang, 93½ tons; Southern Kinta Consolidated, 440½ tons; Taiping Consolidated, 82 tons; Tambah Tin Syndicate, 14¾ tons; Tongkah Harbor, 58½ tons.

AN ACE IN THE HOLE



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PHILIPPINES — Gold market weakens.—Demand for chromite declines.

★**Atok Big Wedge** production for the seven months January-July of this year totalled $1,304,730 from milling 85,531 tons, with average recovered value of $15.25 per ton at the statutory price. This is in line with the production in comparable period of 1948.

★Chromite mining has declined with slackened demand from the United States for both metallurgical and refractory grades of ore. **Luzon Stevedoring Co.** is stockpiling its production. The Chamber of Mines has appealed to the Philippine Government to request that the Philippines shall supply a certain allocation of chromite to the United States under the stockpiling program.

★Production of manganese has been slow for the first 6 months of this year but demand has been better than for chromite. High silica in the ore has been a handicap. Good results have been obtained from manganese mines at Guindulman and Anda on Bohol Island. Ore is hand-washed, with production of 100 tons per day. Output is contracted to Luzon Stevedoring Co.

Operations at the **Philippine Iron Mines at Larap** are proceeding very satisfactorily. The contract to ship to Japan has been extended until April, 1950. Samar Iron Mining Co. is going ahead with development of its property and should start full-scale production in August. This company was second most important iron ore producer before the war.

Mindanao Mother Lode produced $144,000 in July from 8,800 tons of ore averaging $16.40 per ton, a new post-war record in tonnage and recovery. Good ore was encountered on the 850-ft. level and the grade is expected to increase for the next 300 ft. as depth is gained under the rich Tabon ore shoot. The winze sunk on the 700-ft. level continues to be in excellent ore, with virtual assurance it will continue to 850-ft. level. The cross cut to the Godbe structure should reach the objective by mid-August. Work has been started on an addition to the mill, to cost about $50,000, which will eliminate production of concentrates and allow production of a low-grade bullion bar which can be shipped to London for refining at a substantial saving. It is now planned to sink an interior shaft from the 850 to the 1,100-ft. level with three substations.

Late in August the Manila open market for gold broke badly because of anxiety over the Chinese situation and withdrawal of speculators and buyers from the local market. Bids for gold dropped to $41.60 per oz., at which price about 4,500 oz. of low grade bullion were sold by one company. Other producers refused to sell. The market had been over $50 an oz. the previous week. Until recently Ma-

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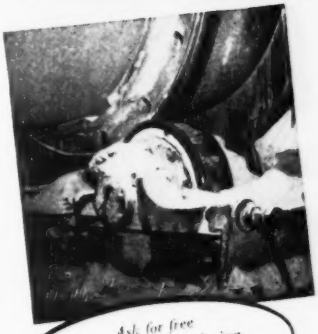

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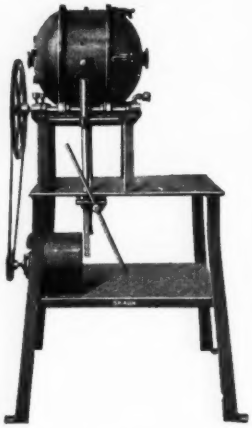

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Philippines *(Continued)*

cao and Hongkong had been the chief outlets for newly-mined Philippine gold. With the Communists closing in on Canton and the South China coast-line this market has been virtually closed for the present. It is generally believed however that the situation will be relieved as time goes on, as somewhat similar restrictions imposed by the Nationalist Government in 1948 failed to halt gold trading for more than a brief period.

AFRICA—Gold industry shows recovery signs.—New company to work Free State goldfields.

★Another new company — **Central Free State Areas Ltd.**—with £5,000,000 capital has been formed to open still further the Free State goldfields. **Central Mining and Investment Corporation Ltd., Union Free State Mining and Finance Corporation, Anglo-American Corporation of South Africa Ltd.,** and **Anglo-Transvaal Consolidated Investment Company Ltd.** are among the companies providing the initial issued capital of £3,000,000.

Some of the issued shares in the company will be made available to the public.

The company will concentrate on the eastern portion of the new goldfield area. Negotiations are in hand to acquire mineral and prospecting options over 80,000 morgen in the north-eastern and eastern portions of the Free State.

★The Union government has appointed a commission to investigate occupational diseases other than silicosis and tuberculosis in the mining industry.

According to its terms of reference, the commission will inquire and report on the nature of certain types of work in, or at, the mines which cause diseases which may result in disability of a permanent or lengthy nature.

★Interesting borehole results have been obtained in the Far West Rand and in further deflections of a borehole being drilled in the Free State for the joint account of **General Exploration (Orange Free State) Ltd.** and **Middle Witwatersrand (Western Areas) Ltd.**

In the borehole H.B. 8 being drilled on the farm Hartebeestfontein 41, in the Klerksdorp district, western Transvaal, Vaal reef was intersected at 5,895 ft. assaying 12 dwt. over a corrected width of 53.3 inches. This result, taken in conjunction with others in the same farm earlier this year, indicates that the area is underlain by payable gold deposits.

The borehole is being drilled for New Pioneer Central Rand Gold Mining Company Ltd.

Green Bar Maker was intersected between 7,244 ft. and 7,335 ft. in borehole E. 8F. on **Doornfontein Gold Mining Co.'s** lease area on the Far West Rand. This hole was completed at 7,728 ft. (Green Bar is a rock marking the level of the Carbon Leader Reef in the West Witwatersrand line).

This confirms as Main Reef the reef intersected at 6,980 ft. The Carbon leader was not intersected on account of the abnormal thickness of the Green Bar.

The latest report of the borehole T. V. 2 being drilled for the joint account of General Exploration (Orange Free State) Ltd. and Middle Witwatersrand (Western Areas) Ltd. is that another conglomerate band in the Elsburg series was intersected between 5,652 ft. and 5,654 ft. The assay gave a value of 26.1 dwt. over 23 in. Core recovery was complete, and boring is continuing.

★Glynn's Lydenburg Ltd. has given notice to the Secretary of Mines that it will have to curtail materially or discontinue mining operations in the near future because of seriously depleted ore reserves and the scattered nature of these reserves at the company's mine at Sabie, in the Eastern Transvaal.

The ore reserve was depleted by 102,500 tons during the past financial year, and at July 31, 1949, it was estimated at 90,400 tons of an average value of 6.9 dwt. over a width of 19.2 in. Development has disclosed no substantial blocks of fresh ore for some time, and the prospect of opening up new shoots, or discovering extensions to existing ones are not good. To maintain the existing rate of milling it has been necessary to mine the south shaft and other safety pillars during recent months.

Every effort is being made to extend the profitable life of the mine as long as possible.

★The Minister of Mines has agreed to grant Vaal Reefs Exploration and Mining Co. a prospecting and mining lease in the Klerksdorp district in the western Transvaal.

If, in the light of future development results, the company wants to apply for a mining lease this will be granted provided the Minister is satisfied the area is underlain by precious minerals in payable quantities. In that case, the percentage of profits payable to the government will be calculated according to the formula: Y equals $12.5 \text{ minus } \frac{75}{x}$. Y is the percentage share of profits payable to the govt., and x the ration of profits to recovery expressed as a percentage. The taxable profit is profit less redemption allowances.

★The gold mining industry appears to be recovering from the setbacks it has suffered in the past few years, due mainly to increased operations.

Gold production in the Transvaal in July totaled 1,018,781 fine ounces, the highest since October, 1946, and the first time the million-ounce mark has been exceeded since October, 1947. The

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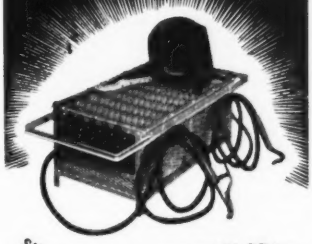

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milling of 4,891,150 tons was also the highest since October, 1946.

Compared with previous months this year, July's working costs of 26s. 1d. a ton milled is the lowest, the previous lowest being 26s. 2d in January. The highest was 26d. 8d in April. Total estimated working profit in July was £2,038,853, the highest this year.

Mufulira Copper Mines Ltd., in Rhodesia, produced 70,966 long tons of copper in the year ended June 30, 1949, deriving a revenue of £8,618,000. The operating expenses were £3,769,500.

After certain deductions, the estimated profit before taxation and subject to such transfers to reserve as the board may make is £4,310,500.

★About 100,000 tons of rock, the entire side of a hill, were blasted away by ten tons of ammo-dynamite in one explosion at Thabazimbi, Northern Transvaal, in the last week of August.

It was the biggest explosion yet conducted in the Union, and was designed to clear overburden from the underlying iron ore which is the South African Iron and Steel Corporation's best source of supply.

This clearing of overburden is usually done by using rock drills and mining the overburden in steps from level to level. The new method, an advance in mining technique, involves the use of well drills. Vertical holes, six inches in diameter, are drilled from one level to the floor elevation of the level below. Additional holes are drilled in the rock face on the lower levels and separate charges are placed in a tunnel in the lower level. The ammo-dynamite is detonated by an instantaneous fuse with a velocity of 17,000 ft. a second.

The first experiment of this nature was conducted in 1943 when 2½ tons of explosives were used and nearly 33,000 tons of rock were broken. The blast was a success and was followed in 1944 by another slightly smaller one. Since then a lower level has been worked at Thabazimbi, and conditions were regarded as ripe for a churn drill blast—hence the big bang.

INDIA

★Indian export figures covering the first half of 1949, just released, show a substantial increase in the shipment of manganese ore but a slight deficiency for export to the hard currency area.

Shipments through June totaled 269,000 metric tons compared with 162,000 metric tons in the same period a year ago. Of this the hard currency countries got 182,000 metric tons, nearly double the 96,000 metric tons shipped a year ago but slightly below the planned figure of 100,000 metric tons a quarter.

Mica exports were off 40% in volume and their value was about $6,900,000 compared with the $9,300,000 earned by larger shipments a year ago.

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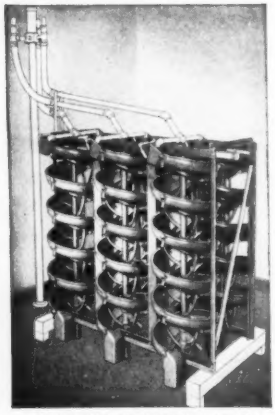

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Personal News *(Continued)*

join him. Can you picture the rush of applicants?

The average mining camp is crude. There are a few larger camps such as Butte, Great Falls, Bisbee. Even these are nothing to rave about. In the States, in a great many cases, if the engineer has children they have to be sent away to be educated. In the foreign field it usually means separating the family when the children reach school age. Practically speaking there are none of the so-called amenities of modern life. By that, I mean theatres, music, libraries, contact with family and friends.

Our modern civilization is so completely dependent on mining that it would collapse if the supply of metals was not kept up. This means not only the common metals such as iron, copper, lead, etc., but the so-called minor ones, such as tungsten.

To keep up this supply the industry needs the best engineering brains. The rich deposits, the easy and wasteful metallurgy is a thing of the past. Our metal supply has to come largely from what was considered waste a few years ago.

The industry is not going to get the men it needs without some inducement. Money is not everything though the younger generation sees top insurance salesmen and auto salesmen earning more than the top managers of the largest companies mining in the States pay. It appears to me that it is time for the industry to become realistic.

ROGER L. BEALS

Rosario, Sinaloa, Mexico

Editor:

Mr. Klover's short article "How You Can Predict Product Screen Analysis" in the June, 1949, issue of E&MJ, indictates that at last engineers are getting on the right track in the science of breaking down rock. This type of graph, using cumulative percent-through against size (or its reciprocal mesh), can be evaluated into surface, and therefore into energy in accordance with the Rittinger theory of crushing.

It should be pointed out, in connection with Mr. Klover's paper, that the feed analyses should be those of complete crushings, in which there has been no screening after crushing. If the oversize from a screening be used as the feed, the resulting screen analysis will be that of the slope of the first crushing operation and it will not be parallel to the original oversize analysis. An oversize analysis would be more or less vertical on the graph.

We have in the literature of the subject a few examples where sizing has been carried out to somewhere about one micron size, and the straight line characteristic continues to that size; it is somewhat reasonable to infer that this characteristic continues, as a straight line, on this type of log-log plot, to the minimum grain size which may be of the order of a millimicron or smaller.

The slope of this straight log-log plot is evidently a characteristic of the particular rock involved, although in several hundred log-log plots which I have accumulated in a period of over 30 years there does not appear any close connection with definite mineral compositions. Quartz and coal appear to have slopes of around one horizontal to one vertical, limestone about two to one, and some of the "porphyries" up to three to one. It took a long time to confirm the fact that screen analyses of a given rock were parallel in all crushings. This was shown in a plot of Bedford limestone crushings, which was added in the revision of my "Kick vs. Rittinger" paper published by the AIME in 1916; this was plotted in log-log form as a suggestion for further investigation.

The finer sizes from a crushing are what might be called secondary products, as being made in the rubbing between the larger pieces as they are broken apart, and they are more liable to plot as straight lines, if accurately screened or sized.

This straight line characteristic may be used for slopes of 1.5 horizontal and over, in the case where more than one crushing is involved, to distribute the energy among the various operations. The straight lines are continued to the 100% lines and a vertical line is dropped from the intersection of the finest of the crushings. The intersections of this vertical with the other screen analyses lines will give the proportional surface, and there energy, of the crushing up to that point, as indicated by the percent weight on the diagram. This can be used to check the validity of the Rittinger theory.

How about "Product Analysis" Graph 2, Taconite Iron Ore, in Mr. Klover's paper? The straight line would hit at about 2,000 microns on the 100% line, and yet it extends over to about 7,000 microns for a rather small amount of product. If 7,000 microns is the desired maximum product of that operation, a lot of fines have been made unnecessarily. Draw parallel, through this 700 point on 100% through, to the other screen analysis lines, and where it passes through the vertical of about 2,000 microns, a rather far-fetched efficiency can be found as the percent through for the intersection. The flattening out at the top is just what calls for circulating loads. Some operators have questioned the value of circulating loads; if the plot is straight to the 100% line, circulating loads are useless. This might have a bearing on the mill diameter.

There have been a lot of dead end roads in this crushing game, and it is hoped that most of them have been by-passed by now.

A. O. GATES

Salt Lake City, Utah

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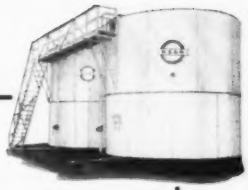

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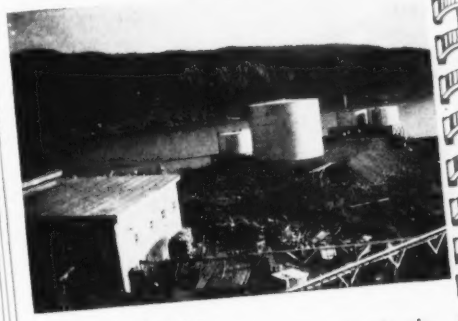

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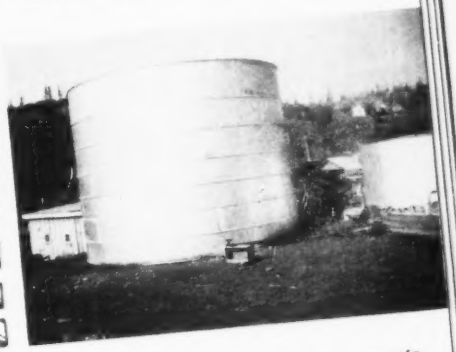

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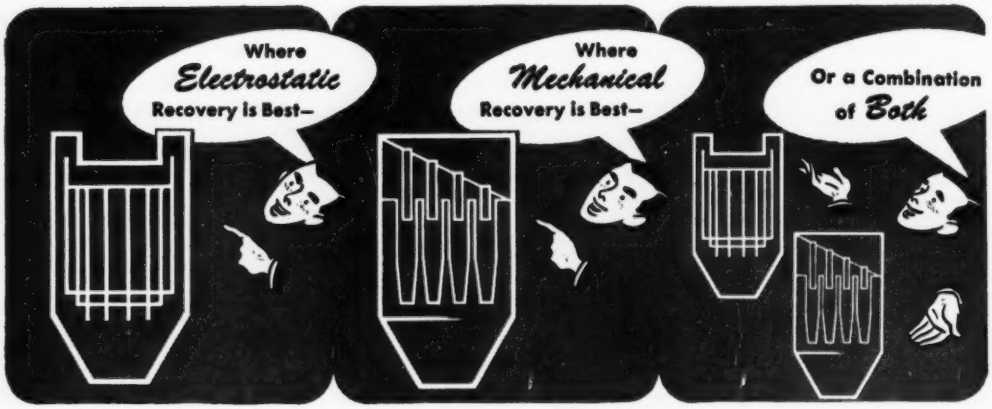

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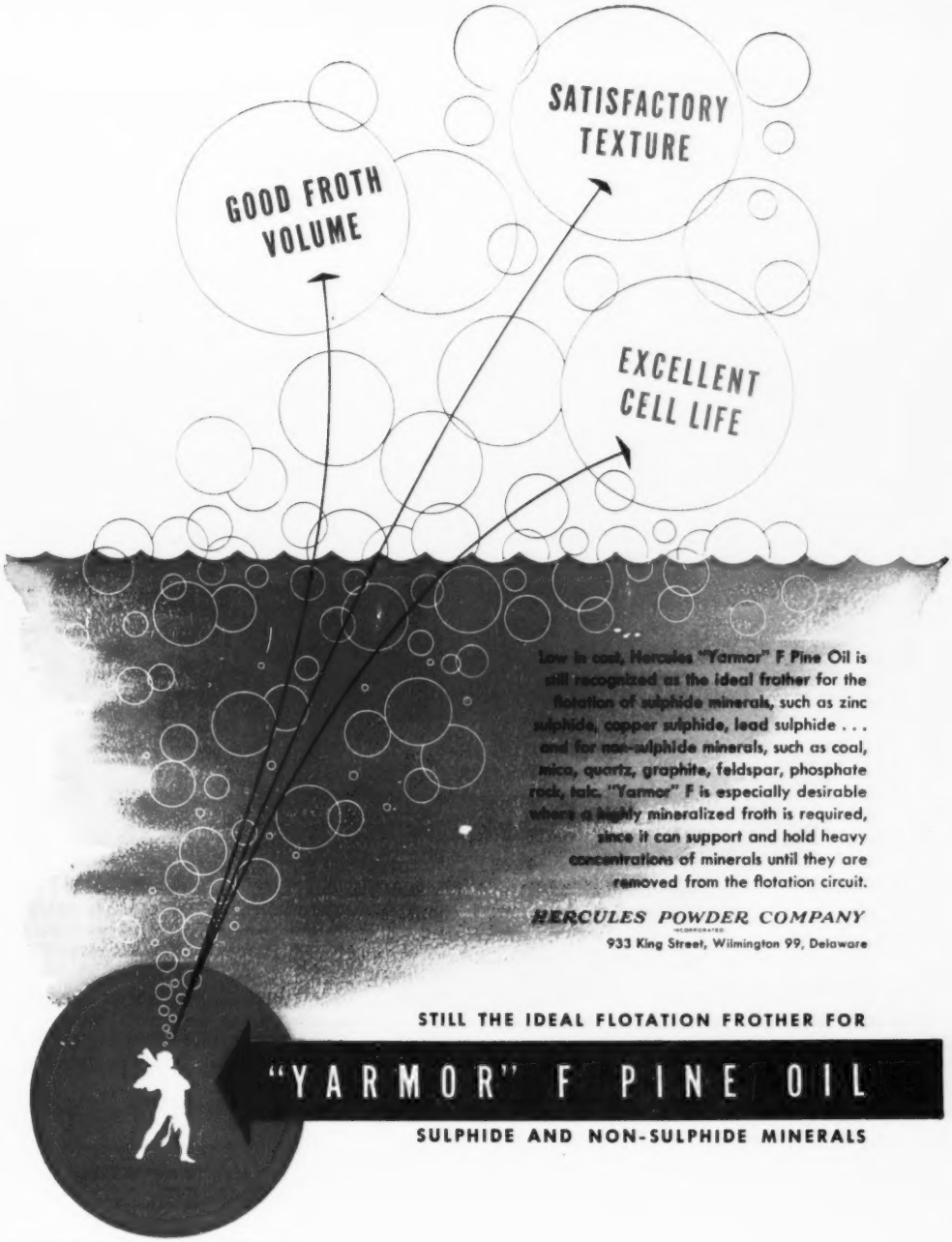

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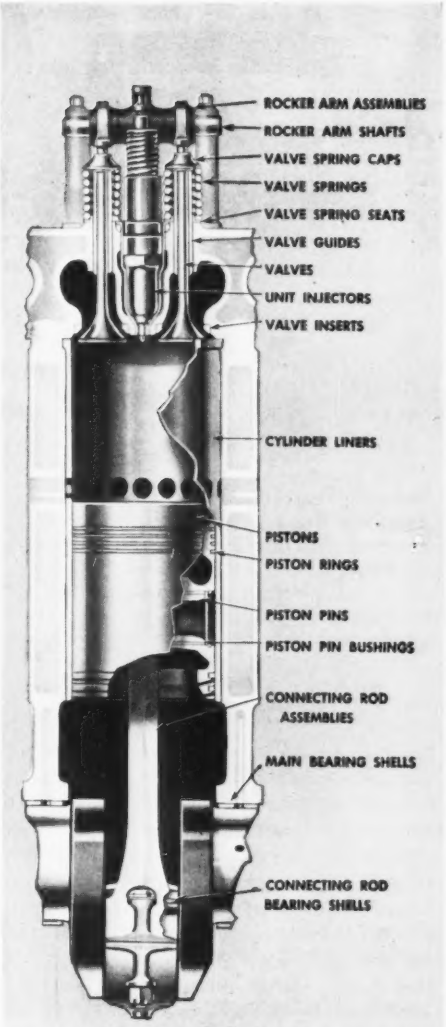

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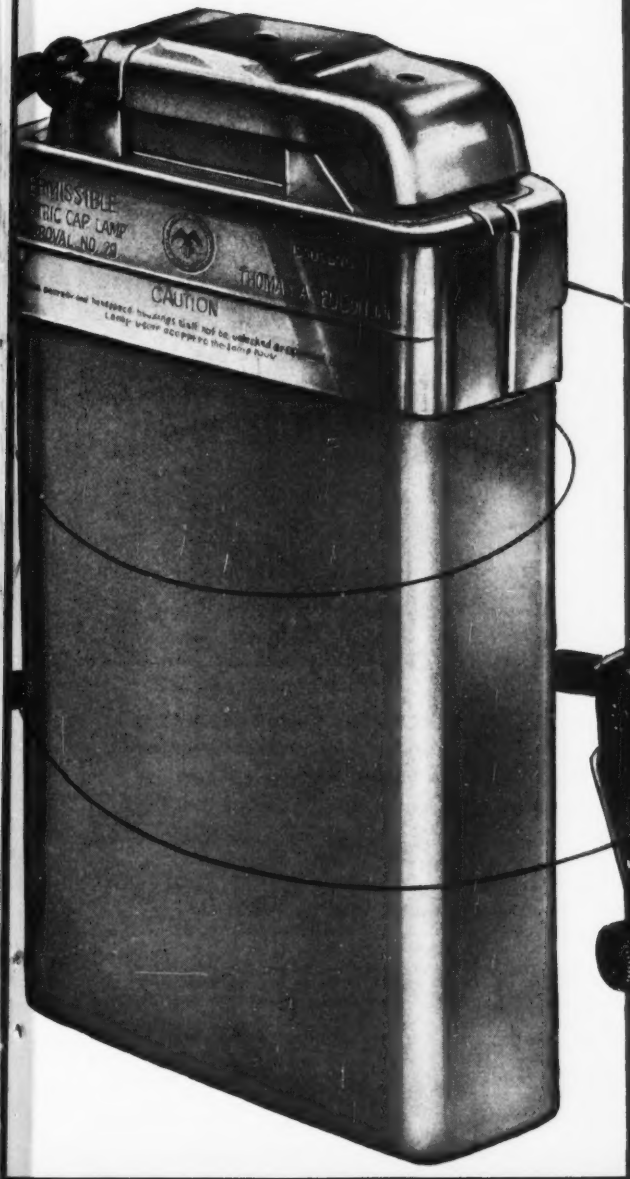

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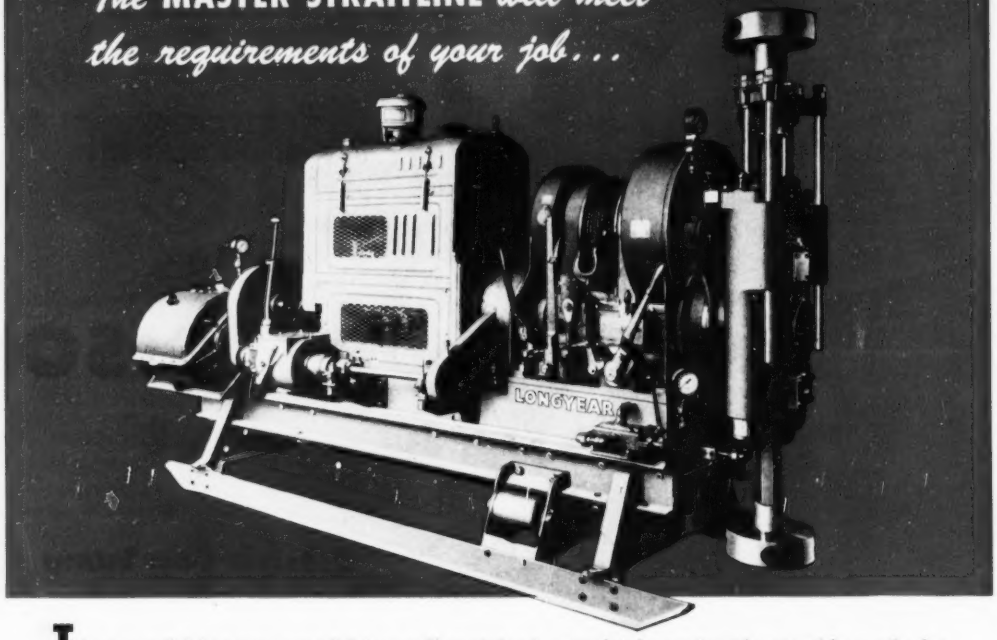

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HOIST—A sturdy, built-in hoist handles the heavy weight of rods. Four speeds are available for the hoist, or for drilling.

The Longyear Master Straitline will successfully handle the exacting demands of your deep drilling. Many users have demonstrated its power, endurance, and steady drilling performance. Put a Master on your job!

BULLETIN NO. 77 GIVES FULL PARTICULARS. WRITE FOR IT.

E. J. LONGYEAR COMPANY

MINNEAPOLIS, MINNESOTA, U.S.A. NEW YORK OFFICE, 1775 BROADWAY

CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
SHAFT SINKING • GEOLOGICAL INVESTIGATIONS

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

THE NEW DU PONT "DETECT-A-METER"

A Single Instrument With 2 Uses

1. A stray current detector 2. A blasting galvanometer

Stray currents have always been a source of danger near blasting circuits. The present increasing use of electric blasting and large electrical equipment increases the danger of stray currents leaking into the blasting system.

The Du Pont "Detect-a-Meter" is the first practical instrument devised for stray current detection. It has two scales: 1—low-range from 0 to 2.5 volts, allowing detection of voltage as low as 0.1 volt, and 2—high-range from 0 to 25 volts. Works equally well on either AC or DC. By finding stray currents before hooking up, you can take steps to eliminate these dangerous conditions.

The "Detect-a-Meter" also performs all the functions of the well-known Du Pont Blasting Galvanometer for checking blasting caps and firing circuits before connecting up. Complete instructions supplied with each instrument.

Today—take an important step toward greater safety in blasting operations by obtaining complete information about the new Du Pont "Detect-a-Meter." It's an inexpensive investment in accident prevention. See your Du Pont Explosives representative, or write E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

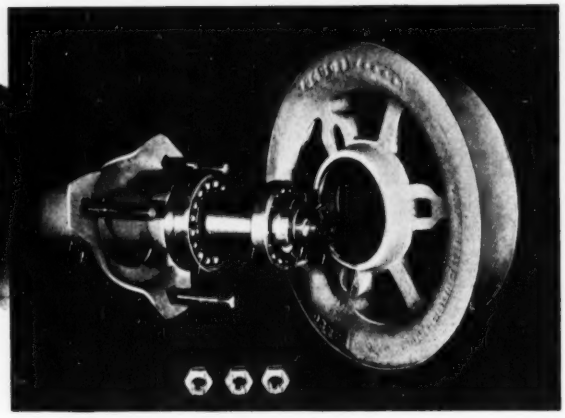
Listen to
"Cavalcade of America"
—Tuesday Evenings—NBC

The new "Detect-a-Meter" is provided with durable genuine leather case with shoulder straps. Actual size of meter —1¾ x 3¼ x 4⅜ inches.

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

are "FLOATERS" Demountable?

YES!..and in less time than it takes to smoke a cigarette...



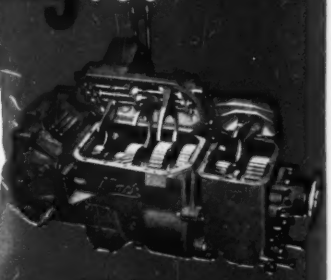
Here's the mine car wheel that you demount as easy as changing the wheel on your automobile. Remove three nuts, slip the S-D "Floater" wheel off, and the bearings remain in perfect adjustment on the axle. When a wheel needs replacing, you want it done *now* — in a hurry. Changing a "Floater" is so quick and simple that it doesn't even require an experienced mechanic. Because of precision fit and closed hub, grease leakage is eliminated to a point where the "Floater" requires fewer greasings than any mine car wheel made. The "Floater" principle of one set of bearings locked and one set which "floats" automatically into perfect adjustment, reduces bearing replacements to a minimum because pinching, out-of-alignment, loose or tight bearings are impossible. When it comes to performance, there is no equal to "Floaters." Independent engineers' tests have proved that up to 50 per cent greater tonnage may be hauled with no increase in power consumed in cars having "Floater" wheels as compared to other types of precision bearings. Write today for Wheel Folder No. 7105.

20 Car loads of "Automatics" from—

SANFORD-DAY IRON WORKS, Inc. Knoxville 9, Tenn.

Inside Reasons Why...

MACK TRUCKS
Take Out Bigger Payloads
Bring In Bigger Profits

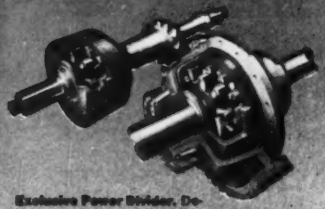


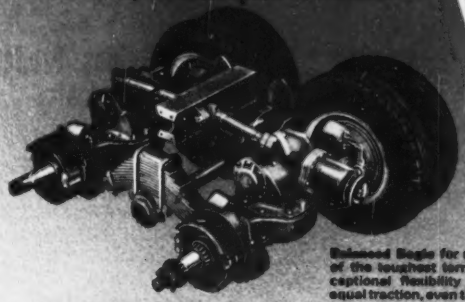
Unitized Transmission. Four-speed main transmission and two-speed compound assembled as a unit. Provides eight forward and two reverse speeds. Most rugged and efficient truck transmission in standard production today.

• In every part, Mack trucks are built to "take it" when it comes to taking out bigger loads with utmost economy!

Here are some of the "inside reasons" why Mack trucks build profits for you by hauling bigger tonnage on faster, uninterrupted schedules.

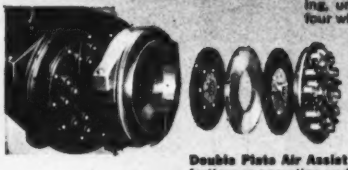
Massive Frame electrically fused into single unit. Alloy-steel I-beam side members are reinforced and braced by huge cross members. Capable of carrying great loads and standing up under tremendous shock.





Balanced Bogie for mastery of the toughest terrain. Exceptional flexibility insures equal traction, even tire loading, uniform braking on all four wheels.

Exclusive Power Divider. Delivers torque proportionately to wheels having the most traction. Eliminates dissipation of power in useless slippage and wasteful wheel spinning.



Double Plate Air Assist Clutch. Effortless in operation, reduces driver fatigue, requires minimum maintenance throughout its long life.

IT'S PART OF THE LANGUAGE:

"Built Like a Mack Truck!"

Mack Trucks, Inc., Empire State Bldg., New York, N.Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Rubber makes a "pipe" dream come true

For years industrial men have been seeking ways to make heavy pipe absorb vibration and wear longer.

Now Hewitt engineers have the answer to this production "pipe" dream . . . a way to reduce replacement costs!

The answer is Hewitt steel-wire-reinforced Flexible Rubber Pipe. This pipe has proved so resistant to harsh abrasive materials that it has doubled and tripled the service life in many installations. What's more, it often costs no more to begin with!

This versatile pipe is being used to carry gritty, abrasive materials in ash disposal systems at power plants . . . high phosphate-content material as well as strong acid and alkali solutions at chemical plants . . . slurries in coal and metal mines . . . and for many other solids-in-solution handling jobs.

H-R Flexible Rubber Pipe is easy to handle and couple. You can curve it and flex it, thus often eliminating costly elbows.

It can be made to resist abrasive actions, to withstand oils, and to stand up against the acids and chemicals that normally attack other materials. And, of course, it won't rust.

For full information on how Hewitt Flexible Rubber Pipe can be applied to your own needs, phone the Hewitt Distributor listed in the classified section of your phone book. Or write direct to Hewitt Rubber Division, 240 Kensington Ave., Buffalo 5, N.Y.

HEWITT

INDUSTRIAL HOSE

HEWITT RUBBER DIVISION

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Hewitt Rubber Division

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Design and construction of complete bulk materials handling systems.

HEWITT-ROBINS HR **INCORPORATED**

PRE-tested...

for the faster, harder blows of modern drills

Cut down costly job delay, and get the most out of your modern drilling equipment by specifying Crucible Hollow Drill Steel. The faster, harder blows of modern rock drills put drill steel to the test. And Crucible Hollow Drill Steel is made and *tested* to take it.

Controlled hardenability, excellence of stress-bearing surface and uniform processing all contribute to *on the job dependability* when you use Crucible Hollow Drill. To back up this fact, every lot of Crucible Hollow Drill is given an accelerated fatigue test which is correlated with *actual granite drilling.*

That's why so many hollow drill steel users are asking for Crucible, they know that for rock drilling Crucible has been proven by performance under service conditions . . . and that lot after lot is produced to chemical and structural uniformity. Check our local representative, he can help you apply Crucible Hollow Drill Steel to your requirements.

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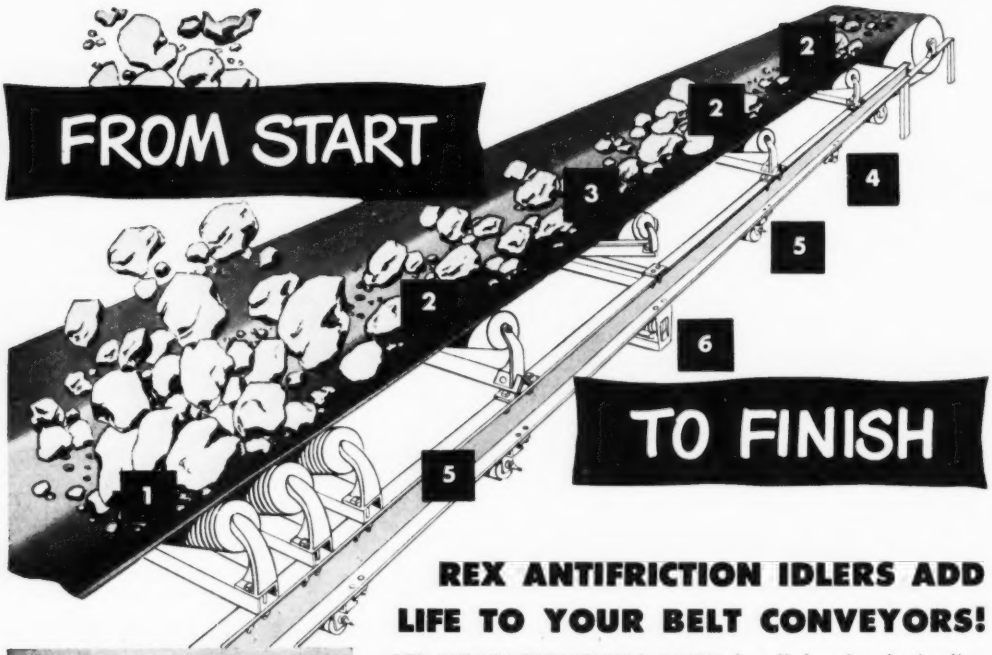
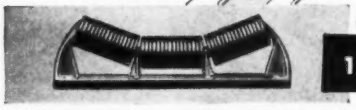
CRUCIBLE first name in special purpose steels

HOLLOW DRILL STEEL

HIGH SPEED • TOOLS • STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS

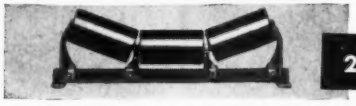


REX ANTIFRICTION IDLERS ADD LIFE TO YOUR BELT CONVEYORS!



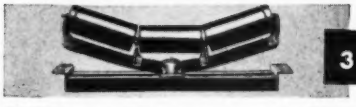
1

REX IMPACT CUSHIONING IDLERS installed under the loading points will take the bumps for your belts . . . minimize ruptures and lacerations. Dual-purpose rubber rolls are scientifically molded with deep primary grooves for maximum cushioning and secondary grooves that provide surface softness to avoid belt laceration.



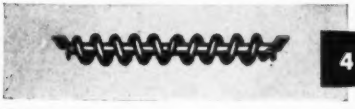
2

REX TROUGHING IDLERS insure minimum service cost and maximum equipment life. Belt friction wear is practically eliminated, and the closely spaced, well-balanced roll units provide an idler assembly that is kind to the belt. There is a type and style for every application.



3

REX SELF-ALIGNING TROUGHING IDLERS automatically align belts without the need for side-guide idlers that impose excessive belt edge wear. They eliminate the misalignments caused by off-center loading, side-wind drifting, warped frames or uneven belt stretch. These idlers fit any belt conveyor frame.

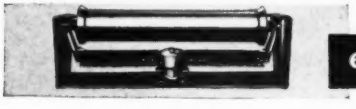


4

REX RUBBER-COVERED SPIRAL RETURN IDLERS create an ever-changing point of contact between belt and idler. Ice, abrasive, corrosive and sticky material cannot build up on the idler and cause premature wear and operating difficulties.

5

REX RETURN IDLERS are dead or live shaft type idlers with hydraulic type fittings for high pressure grease lubrication. They are sturdily built, and their smooth-rolling action cuts belt wear to the minimum.



6

REX SELF-ALIGNING RETURN IDLERS assure automatic belt alignment on the return run. They are similar in general design and effectiveness to the Rex Self-Aligning Troughing Idler.

For complete details on these and the many other idlers in the complete Rex line, write for your copy of Bulletin 463-R. Chain Belt Company, 1679 West Bruce Street, Milwaukee 4, Wisconsin.

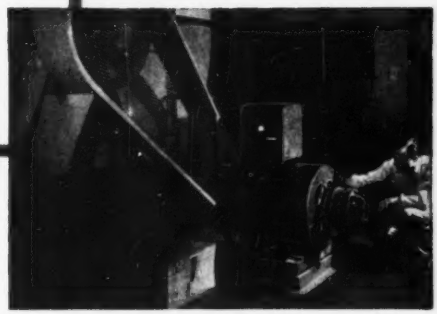
CHAIN BELT COMPANY REX BELT CONVEYOR IDLERS

How to carry
MORE POWER
over your lines

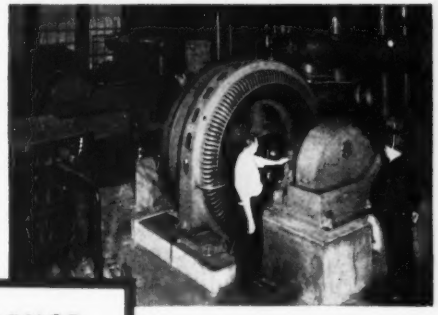
Power factor improvement—just one of the operating advantages of E-M Synchronous Motors—removes a burden from your power line. Synchronous Motors, in addition to driving their connected mechanical load, supply magnetizing current to offset the low power factor of induction motors and other equipment. Large-power Synchronous Motors may often be added to existing lines and transformers without raising kva to a level requiring larger feeders, transformers and control equipment.

Because transformers and distribution lines are limited in their kilowatt capacity by the total kva they must carry, Synchronous Motors—by furnishing leading kilovars—replace lagging kilovars in the line with kilowatts for useful work. Providing your own leading kilovars, rather than buying them from the power company, usually results in reduced power billing. As a further benefit, steady voltage is maintained on a higher level than would be the case at a lower power factor.

Besides these savings and advantages, E-M Synchronous Motors give you constant speed, wide range of speed ratings, high stability under voltage dips. It's this double-duty performance that makes them the most efficient drive in industry.

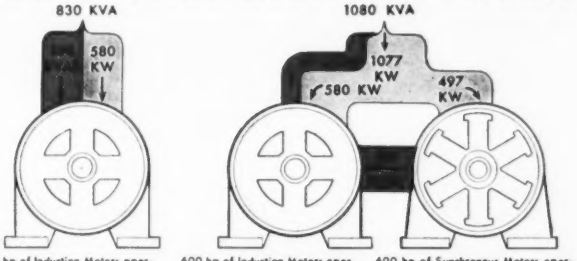


●One of five E-M Synchronous Motors applied to air conditioning fans to improve power factor in a large engine gear plant in Indiana. The motors are 60 hp, 1200 rpm.



●Both of these 500 hp, 180 rpm Synchronous Motors operating air compressors at Motor Products Corp., Detroit, Mich., feature power factor correction at 0.7 leading pf.

POWER FACTOR MAKES A DIFFERENCE



600 hp of Induction Motors operating at 0.7 lagging power factor —580 KW, 830 KVA, 590 KVAR.

600 hp of Induction Motors operating at 0.7 lagging power factor —580 KW, 830 KVA, 590 KVAR.

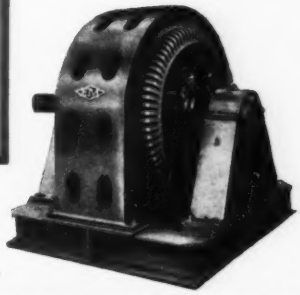
600 hp of Synchronous Motors operating at 0.7 leading power factor—497 KW, 711 KVA, 507 KVAR.

In the system operating at low power factor the lagging kilovars carried by the line may equal or exceed the kilowatts doing useful work.

Addition of Synchronous Motor drives to this system permits doubling the horsepower capacity, with only a 30% increase in kva.

A2033

Write for
"The ABC of Power Factor"



Send for 20-page illustrated booklet, "The ABC of Power Factor."

ELECTRIC MACHINERY MFG. CO.
Minneapolis 13, Minnesota

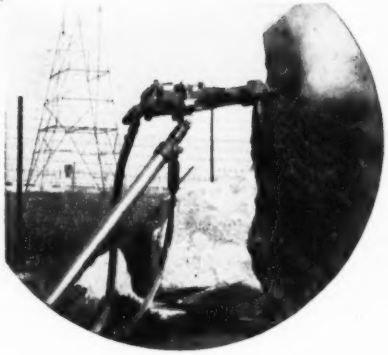
NEW Thor SINKER LEG

45% MORE FOOTAGE AT FAR LESS COST!

Here's real savings in labor . . . man hours . . . and drilling costs . . . and 45% more drilling footage by actual tests!

The miner can carry the entire setup—Thor Sinker and Thor Leg—into the smallest tunnel or closest corner, set it up in an instant, start the hole . . . and then let Thor do the work! All he does is control the *constant pressure* feed by operating two simple throttles—*the only automatic controls in leg operation!*

Think of the savings . . . both in operating costs and air consumption. With carbide bits the Thor Leg can replace drifters—and heavy mountings on scores of heavy duty operations . . . can drift in tunnels where drifters won't fit. Write today for catalog data.



FULLY AUTOMATIC—A quick, easy setup—just start the hole—set the leg at any angle between 30 and 45 degrees. . the leg does all the lifting—all the constant pressure feeding . . . control the feed with a turn of the wrist!

INDEPENDENT PNEUMATIC TOOL COMPANY

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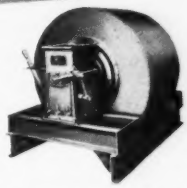
Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

You Can Cut Today's High Production Costs with STURTEVANT EQUIPMENT

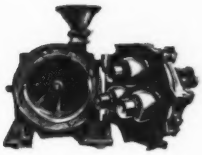
AIR SEPARATOR

For separation of fines to 325 mesh and finer. Increases output from 25% to 300% . . . lowers power costs by 50%. For years, this separator has been the standard in the cement industry.



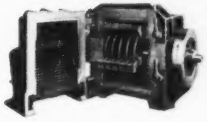
DUSTLESS BLENDER

Four-way mixing action assures a thoroughly blended product. Open-door accessibility permits easy cleaning. Available in many mixing capacities for ¼ ton per hour and up.



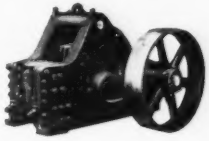
RING-ROLL MILLS

For medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open-door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



SWING-SLEDGE MILLS

For coarse and medium reduction (1" to 20 mesh). Open-door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.



JAW CRUSHERS

For coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.

Sturtevant equipment, such as illustrated, helps you overcome high labor and production costs by increasing output. In addition, their rugged construction assures long life with minimum maintenance. It will pay you to investigate these machines. Write for information.

STURTEVANT MILL COMPANY
101-A CLAYTON STREET, BOSTON 24, MASSACHUSETTS

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS
CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

MAIL COUPON TODAY!

STURTEVANT MILL COMPANY
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Gentlemen:
Please send me your catalog. I am especially interested in _____

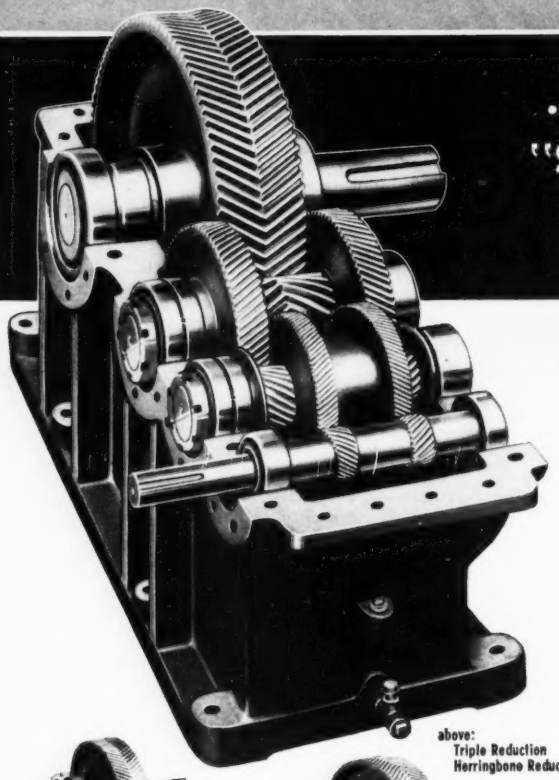
Name _____

Street _____

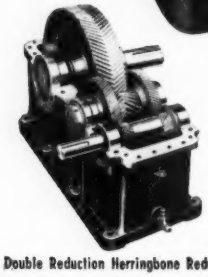
City & State _____

THIS GEAR ARRANGEMENT
GIVES PERFECT BALANCE & SYMMETRY

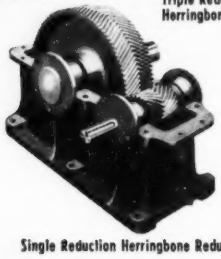
. . and Bearings "Share the Load" *Equally*



above:
Triple Reduction
Herringbone Reducer



Double Reduction Herringbone Reducer



Single Reduction Herringbone Reducer

..another feature of

Philadelphia
HERRINGBONE
Speed Reducers

● Just one of the well planned construction features of these widely used Reducers, is the "Gear Arrangement" in the Double and Triple Reduction Type . . . the gears are located symmetrically in relation to the centerline of the housing, rather than the usual offset arrangement. It will be noted that 2 standard bearings are used on each shaft and *each bearing absorbs an equal load.* (In comparison to the offset arrangement of Herringbone Gears, which result in unequal bearing loads, while similar arrangement of single helical gears impose an additional load by the thrust action) . . . It is evident then, that Philadelphia Herringbone Reducers with double helical gears spaced equidistant from the bearings in the first and intermediate reductions, with a continuous tooth herringbone gear set on the centerline for final reduction, *provide perfect balance and symmetry.*

For complete construction details, get our Catalog H-49. Please write on your Business Letterhead.

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON
IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

DESIGNED for the TOUGHEST JOBS!

A Model LD Rear-Dump "Euc" receives a 30-ton load of rock overburden from a 6-yard shovel at a Pennsylvania open pit anthracite operation. Owner: Pioneer Construction Co. of Shamokin, Pa.

"EUCS"

22 tons of overburden from an open pit copper mine in Arizona are dumped over the waste bank by a Model TD Euclid. Isbell Construction Co. of Reno, Nevada owns a large fleet of these Rear-Dumps.

Assure HIGH PRODUCTION at LOW COST

Rear-Dump Euclids are built for long, efficient service in open pit mines and quarries and off-the-highway construction and industrial work. For moving rock, coal, ore, overburden, and other heavy excavation, Rear-Dump "Eucs" have the capacity and speed to haul bigger loads faster and at lower cost per ton or yard moved.

There are models for every hauling requirement... and body designs for all types of materials. Rear-Dump Euclids of 10 to 34-ton capacity are ruggedly constructed to withstand the impacts of loading heavy excavation and hauling over rough roads. Outstanding features include the Euclid planetary type drive axle for long life and continuous performance... sturdy body with smooth interior and flared rear chute... welded frame of tremendous strength... fast, double-acting hydraulic hoist... and loaded travel speeds up to 35.4 m.p.h.

The parts and service facilities of Euclid's world-wide distributor organization assure prompt, efficient service wherever Euclids are used. Write for complete information on the Euclid line of earth moving equipment or see your distributor... today!

The EUCLID ROAD MACHINERY Co. Cleveland 17, Ohio

EUCLIDS *Move the Earth*

OVERGROUND OR UNDERGROUND, GENERALS ARE BUILT TO LAST LONGER, WORK BETTER, FASTER, *at Lower Cost*

The *General H. C. T.* is specifically designed for most work on the road, some off. Perfect for trucks that work in and out of mines. More rubber on a stronger carcass disperses more of the load over the thicker traction tread. Wide, self-cleaning shoulders prevent spinning and side-slipping. With more rubber all around the *General H. C. T.* gives you more original miles, extra recap miles for more profit in every load.

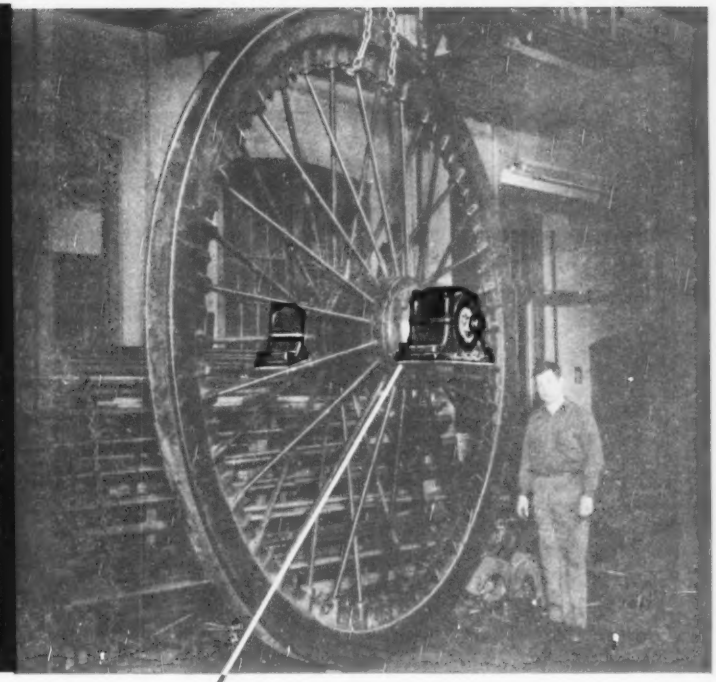
You can depend on the tough, Top-Quality *General L. C. M.* to give long service under punishing treatment on razor-sharp mineral surfaces. The *General L. C. M.* is designed for trucks that must work 80% in the stripping area and 20% over-the-highway. Thick lugs form a self-cleaning traction tread. Tremendous shoulders prevent cutting, bruising, chafing and chipping. On the highway the L. C. M. rolls smoothly, steers easier.

General's new underground mining tire with extra wide, extra deep tread and tremendously thick, reinforced sidewalls give extra protection against snags, cuts and bruises—many extra hours of wear.

The GENERAL TRUCK TIRE

THE GENERAL TIRE AND RUBBER CO. ★ AKRON, OHIO

Holmes 12-foot sheave wheel and SKF Pillow Blocks . . . teamed for efficient operation



A sheave wheel takes a lot of punishment, and mine operation depends on its smooth-running efficiency. That's why Robert Holmes & Bros. specified SKF SDAF Pillow Blocks . . . on the five 12-foot diameter, bicycle type, sheave wheel assemblies furnished for Peabody Coal Company's new mine at Pana, Illinois.

Here are features of SKF Pillow Blocks . . . widely used in mines, mills and factories. Check this list:

- **Rugged—stands up under heavy usage**
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- **Minimum Maintenance—equipped with SKF's exclusive Triple-Seal rings to keep lubricant *in* . . . dust and water *out*!**
- **Versatile—there's a pillow block for every job!**

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PILLOW BLOCKS ENGINEERED BY SKF

THE MODERN WAY

To Protect Vital Machinery from Tramp Iron Damage

NEW! Dings ALNICO MAGNET PERMA · PULLEY*

AND PULLEY TYPE SEPARATORS

No wiring . . . no electrical accessories . . . no operating cost . . . no maintenance . . . good for life . . . tremendous power . . . completely automatic — The new Dings PERMA-PULLEY is a revolutionary contribution to magnetic separation. You can install it and forget it!

Backed by 50 years of magnetic separator manufacturing experience, this new pulley offers these plus features that assure you of maximum tramp iron removal:

- **Extra high strength grade of Alnico**
- **Closely spaced poles**
- **Magnetic strength equal across entire belt width**
- **Crowned face to prevent belt weave**
- **Extremely high surface strength**

Dings PERMA-PULLEYS are available in 53 sizes with shaft diameters to suit your requirements. ALSO complete pulley type separators with PERMA-PULLEY, idler pulley, belt and drive in any size required. SEND for new CATALOG C-1007A.

DINGS MAGNETIC SEPARATOR COMPANY

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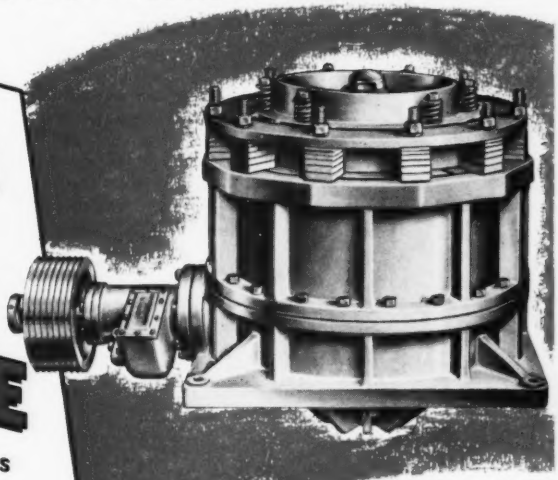
"CRUSHING WITHOUT RUBBING" CUTS PRODUCTION COSTS

PENNSYLVANIA

Presents the

KUE-KEN GYRACONE

Less wear on Crushing Faces
—Lower Power Consumption



Kue-Ken Crushing Principle

Friction is the archenemy of Crushers. Slipping, rubbing and grinding consume excess power, wear costly crushing faces, lower capacity. But note how the new Kue-Ken crushing head, when gyrating about its apex point, follows arcs that pass *squarely* through the crushing zone. Rock is instantly gripped and crushed, not forced upwards. This is proper engineering —positive, efficient crushing by *pressure only*. Faster, finer crushing at *less cost per ton*.

The new Kue-Ken Gyracone is a rugged, compact, powerful Crusher that needs little headroom, fits easily into your flow sheet. Frame is cast steel. Giant shaft is 5 times stronger than in ordinary cone crushers. Lubrication is abundant and sealed. An automatic switch stops the Kue-Ken if oil pressure is below normal; an overload release guards against tramp iron. The Kue-Ken Gyracone can be choke fed and is quickly adjustable for different product sizes. For mine, quarry, and industrial operations.

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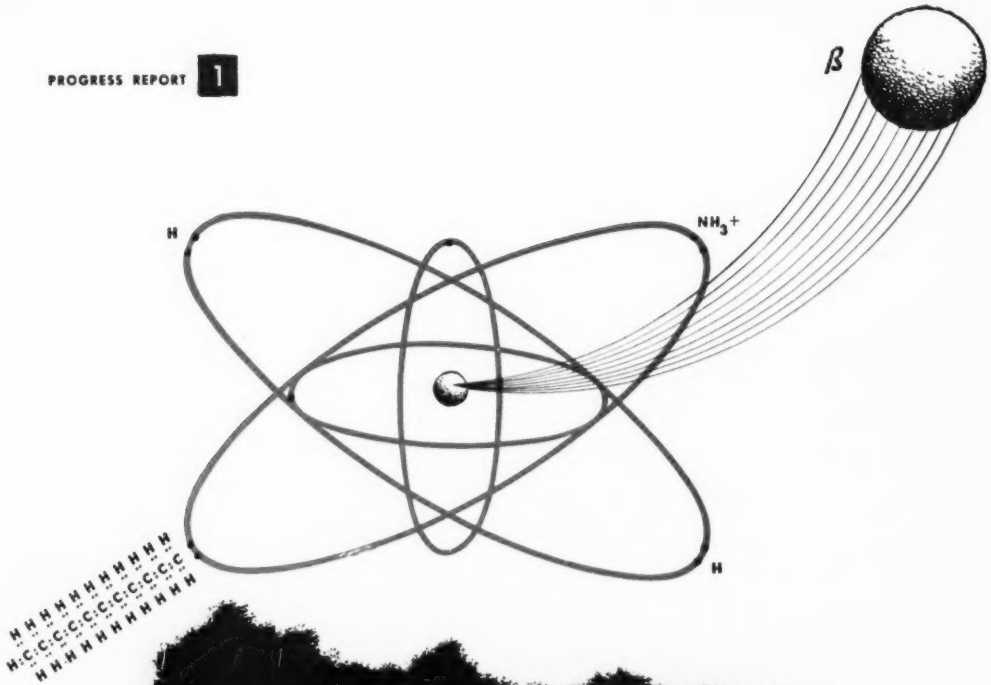
PROGRESS REPORT 1



Radioactive Flotation Reagent

Radioactive tracers in flotation and the use of carbon 14*

Radioisotopes have the same chemical properties as the corresponding inactive elements, differing from them only by their nuclear instability. This combination of properties permits radioelements to act as atomic tracers, the tracer atoms revealing themselves at the time of their decay by emission of electrons and positrons (beta radiation), helium nuclei (alpha radiation) or electro-magnetic radiation (gamma radiation). Tracer technique is particularly attractive for the study of surface chemistry problems in general and flotation problems in particular because of its extreme sensitivity.

To get an idea of this extreme sensitivity it may be useful to recall that gravimetric analytical methods will not permit the weighing of anything much lighter than one-hundredth of a milligram of material. Under the most favorable circumstances, this represents an uncertainty in the answer of 10^{16} atoms, or 10,000,000,000,000,000 atoms. Accurate spectrographic methods possibly have a sensitivity 10,000 times greater than this, but the uncertainty is still of the order of 10^{12} atoms. The tracer permits ascertainment of decay of a single atom so that its sensitivity, without half trying, can be several orders of magnitude greater than that of any other method available to chemists.

In addition to the quality of extreme sensitivity, the tracer technique permits the labeling of individual additions of agents and therefore of dealing with problems in which self-diffusion or self replacement is thought to occur. Carbon 14 ($_6C^{14}$) is unique because carbon enters as an essential ingredient in all collecting and frothing agents.

*By A. M. Gaudin, P. L. de Bruyn, F. W. Bloecher, and C. S. Chang
Massachusetts Institute of Technology; Members, AIME

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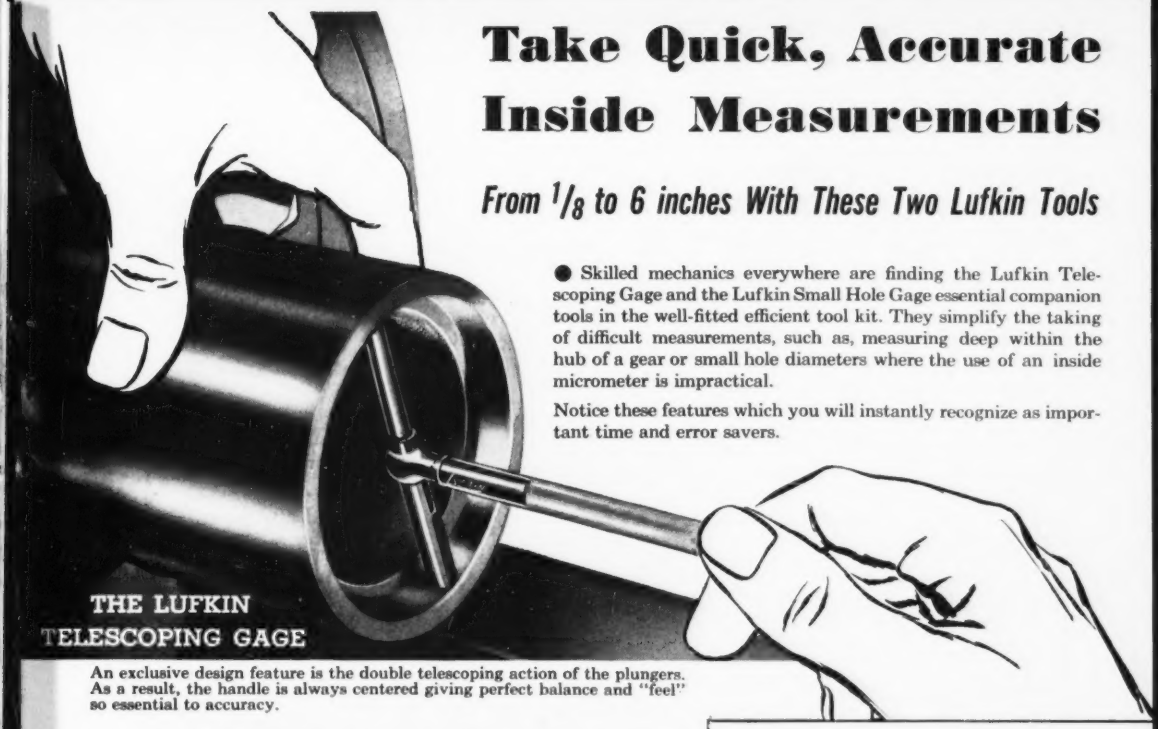
Take Quick, Accurate Inside Measurements

From 1/8 to 6 inches With These Two Lufkin Tools

● Skilled mechanics everywhere are finding the Lufkin Telescoping Gage and the Lufkin Small Hole Gage essential companion tools in the well-fitted efficient tool kit. They simplify the taking of difficult measurements, such as, measuring deep within the hub of a gear or small hole diameters where the use of an inside micrometer is impractical.

Notice these features which you will instantly recognize as important time and error savers.

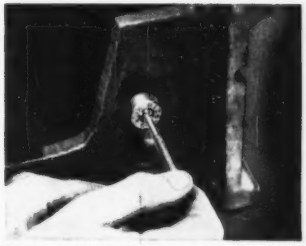


THE LUFKIN TELESCOPING GAGE

An exclusive design feature is the double telescoping action of the plungers. As a result, the handle is always centered giving perfect balance and "feel" so essential to accuracy.

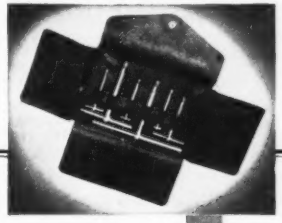
LUFKIN Telescoping Gages and New Small Hole Gages

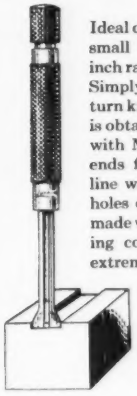
Measurements down to one thousandth inch or less are taken from the gage with a Micrometer.



Each gage has its own handle sized in direct proportion to its plunger range, assuring perfect balance found in no similar gage.

Available individually or in sets packed in a durable leatherette case. Range 5/16 to 6 inches.





Ideal companion tool for measuring small holes or slots below the 5/16 inch range of the Telescoping Gage. Simply insert ball end in hole—turn knurled knob until right "feel" is obtained—then measure ball end with Micrometer. Gages have ball ends flattened off close to center line which permits gaging shallow holes or grooves. Provision is also made whereby travel of the expanding cone is stopped at both the extreme open and closed limits of the gage preventing breakage. Available individually in four different sizes, or as a complete set with range of 1/8 to 1/2 inch.

Write Dept. EM for fascinating booklet, "The Amazing Story of Measurement." Enclose 10c (no stamps) to cover handling and mailing.

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Increase Output
More Trips
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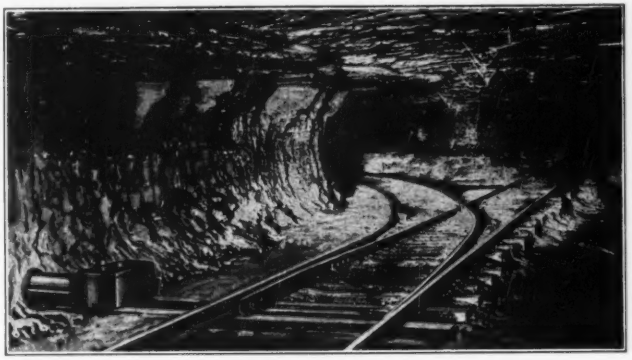

"Canton" Automatic Switch Throw

GREATEST number of trips in a given time is accomplished by the "Canton" Automatic Switch Thrower. This eliminates stopping for switch to be thrown, saves labor, eliminates that accident potential. For further safety, signal lights show position of points, and if blocked or split. All flashing and sparking at points of contact with trolley wheel are eliminated. This unit is as nearly fool-proof as is possible. Constructed on the solenoid principle in combination with patented automatic cutout, actuating mechanical connection to the Track Switch, instantly throwing the switch points against the rail on either side of track. Can be used as an automatic derailer, protecting life and property . . . operated usually by the motorman while traveling full speed ahead.

Write for complete descriptive catalog, using street and zone numbers.

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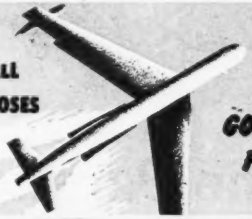

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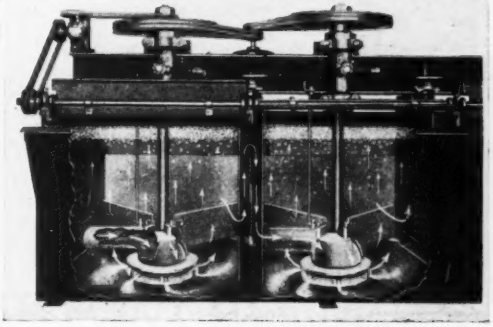

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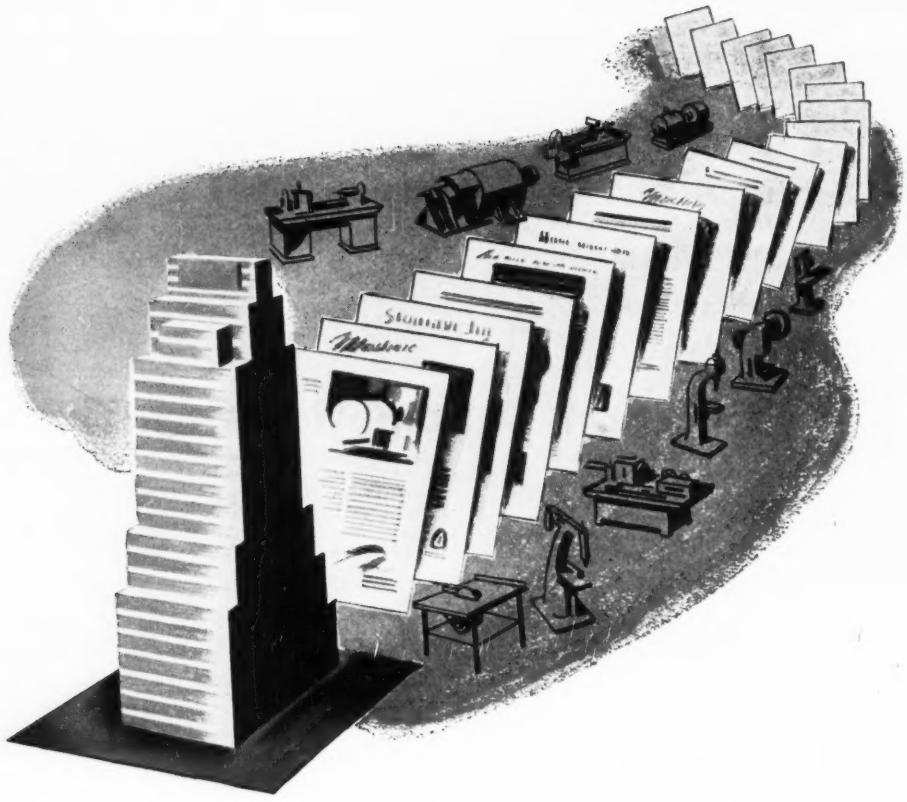

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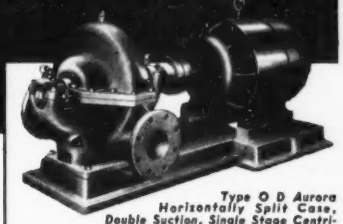

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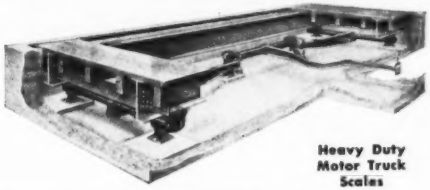

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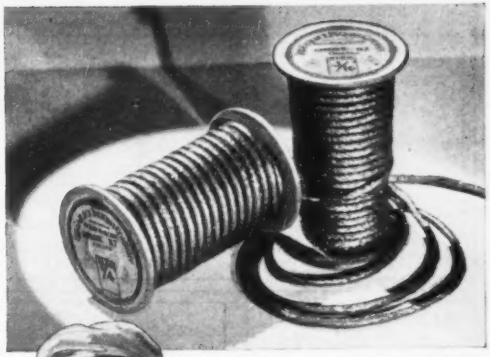

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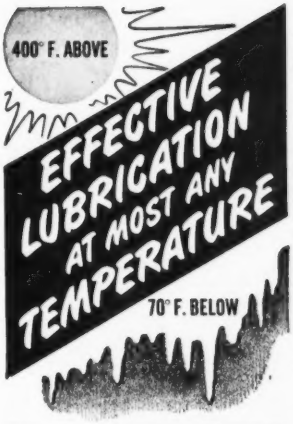

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America finds a new, easy way to save

Out of the war has come one blessing—a lesson in thrift for millions of those who never before had learned to save.

Enrolled under the Payroll Savings Plan in thousands of factories, offices, and stores, over 27 million American wage earners were purchasing "E" Bonds alone at the rate of about 6 billion dollars worth a year by the time V-J Day arrived.

With War Bond Savings automatically deducted from their wages every week, thrift was "painless" to these wage earners. At the end of the war, many who never before had bank accounts could scarcely believe the savings they held.

The moral was plain to most. Here was a new, easy way to save; one as well suited to the future as to the past. Result: Today, millions of Americans are continuing to buy, through their Payroll Savings Plan, not War Bonds, but their peacetime equivalent—*U. S. Savings Bonds.*

From war to peace! War Bonds are now known as U. S. Savings Bonds, bring the same high return—$25 for every $18.75 at maturity.

Out of pay—into nest eggs! A wage earner can choose his own figure, have it deducted regularly from earnings under Payroll Savings Plan.

New homes to own! Thousands of new homes, like this, will be partially paid for through Bonds wisely accumulated during the next five to ten years.

Keeping cost of living in check! Buying only needed plentiful goods and saving the money which would bid up prices of scarce goods keeps your cost of living from rising. Save *automatically—regularly.*

Weekly Savings	SAVINGS AND INTEREST ACCUMULATED	
	In 1 Year	In 10 Years
$ 3.75	$195.00	$2,163.45
6.25	325.00	3,607.54
7.50	390.00	4,329.02
9.38	487.76	5,416.97
12.50	650.00	7,217.20
15.00	780.00	8,660.42
18.75	975.00	10,828.74

Savings chart. Plan above shows how even modest weekly savings can grow into big figures. Moral: Join your Payroll Savings Plan next payday.

SAVE THE EASY WAY...

BUY YOUR BONDS

THROUGH PAYROLL SAVINGS

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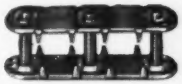
for mending and patching heavy conveyor belts



Multiply the serviceable life of your heavy conveyor belts by patching worn spots and closing tears with PLATEGRIP Repair Plates. Easily applied, anywhere, they make strong, flush, dust-tight joints, that ride smoothly over all pulleys, outlast the belt.

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The advertising rate is $9.75 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. E.M.J.

NEW ADVERTISEMENTS received by 10 A.M. October 20th will appear in the issue of November subject to limitations of space available.

REPLIES (Box No.): Address to office nearest you.
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

MINE FOREMAN, college graduate, experienced metal miner, standard three-year contract, single status or if married single status for six months, working knowledge Spanish essential, starting base salary $4,800 yearly plus bonus one month yearly, free transportation to Bolivia by air for employee and wife, four weeks vacation yearly, free living quarters. P-9817, Engineering & Mining Jl.

CHIEF WAREHOUSEMAN—Preferably college graduate, experienced capable handling operating, maintaining, ordering warehouse, mine, mill, electrical, general supplies materials, equipment, and accounting thereof; single or if married single status for six months; standard three year contract; base salary $425.00 monthly plus bonus one month yearly, fluent working knowledge Spanish essential; transportation furnished to Bolivia by air for employee and wife; four weeks vacation yearly plus free living quarters. P1055, Engineering & Mining Journal.

EXPERIENCED MAN WANTED

To head newly established department for the sale of rock drills and tungsten carbide tipped steels to mining and construction companies.

Excellent opportunity for the right person, as equipment enjoys world-wide reputation.

Send replies to P 9725, Engineering & Mining Jl., with age, complete merit list and references.

POSITION VACANT

JUNIOR MINE Engineer, college graduate, competent underground surveyor, draftsman, standard three-year contract, knowledge Spanish desirable, starting base salary $2,700 yearly plus bonus one month yearly, single, free transportation to Bolivia by air, four weeks vacation yearly, free living quarters. P-9818, Engineering & Mining Jl.

POSITIONS WANTED

CYANIDE MILLMAN, Foreman, shifter, desires position, many years' experience, large and small plants, technical background, age 44. Best references. Foreign locations, States and Mexico preferred. PW-9933, Engineering & Mining Jl.

MANAGER OR Assistant Manager, graduate mining engineer, capable, competent, ability, initiative, many years' experience with labor problems and in charge large mining operation. PW 1637, Engineering & Mining Jl.

MINING ENGINEER: 15 years' varied experience, engineering, geology, supervision, excellent references. Immediately available. PW 1638, Engineering & Mining Jl.

MILL, OR General Superintendent. Ore Dressing Metallurgist. E Met. 34 from C S M, age 40, married and two children. Capable Executive, successful in labor relations, current on mine-mill equipment and methods. Experience varied: U. S. 10 years, foreign 6 years, fair Spanish. Mill construction, operation, supervision. Metallic and Nonmetallic ore dressing; testing, research, and application. Metal mine supervision. Mine examination; supervision of assaying, surveying, drilling, mapping and planning. Desire responsible position with future. Available 30 days. PW-9882, Engineering & Mining Jl.

• **STRIPPING CONTRACTOR**

wants a 50,000,000 Cubic Yard or larger project.

• **HAVE EXPERIENCED CREW,**

equipment, core drill, etc., available.

• **PREFER WORK IN UNITED STATES**

or Canada; but will consider work elsewhere.

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Do you wish to
INCREASE THE ECONOMIC EFFICIENCY OF YOUR FLOTATION PROCESS?

Net Xanthate consumption of certain types of sulfide ores can be cut by 50-75% by regeneration and re-use. If your xanthate cost exceeds $4,000 per year, contact us for details.

SS-9989, Engineering & Mining Journal
330 West 42nd St., New York 18, N. Y.

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2 CLAIMS
Mineral Survey 3596-3597. Kennecott Corp. Claims on All Sides at Ray.
WEST END MINING CO.
1921½ Maple Ave., Los Angeles 11, Cal.

SLUDGES WANTED
If you have any metallurgical or chemical by-product sludges which may contain rare or minor metals, please contact:
Metallurgical Process Division
Saratoga Laboratories, Inc.
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Sludges bought outright or recovery processes developed under contract.

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No lengths too long or too short.
Telephone: EAstgate 7-4778
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W9800 Engineering and Mining Journal
330 W. 42nd St., New York 18, N. Y.

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One Block. Near Castle Dome Mine. Sulphide Ore. $15.00 per Acre.
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Ores and chemicals—any raw materials from owners.
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(25 years Mining experience)
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60 million tons bituminous coal, reports any public library, U. S. Geol. Su. Bull. 225—Page 240-246, or Deer Creek Coal Field. $15.00 per acre.
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WORLD'S FINEST SURVEYING INSTRUMENTS
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DIESEL POWER PLANT
1—200 KW, 400 RPM Buckeye
1—100 KW, 400 RPM Buckeye
Complete with switch gear and all accessories. GM 2-71 Power Units for shovels, gravel plants, etc. Attractive prices. Immediate delivery.
ROBERT L. NEISWANDER
Lima, Ohio — Cable Address: OHIODIESEL

(Continued from page 183)

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Operating West Coast South America, has opening for Sales Engineer familiar with mining and milling machinery. General sales and service. Preferably graduate engineer with sales ability. Advise age, marital status, experience. Spanish advantageous but not essential. Reply BO-3091, Engineering & Mining Jl.

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variety amethyst, strong color and of fine crystalization. Only one in the continent. Located in State of Guerrero. Any information write to Asociacion Nacional de Cosecheros. Havre 43-A. Mexico City.

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DRAG SCRAPER OUTFIT: Sauerman 1½ yd. Crescent bucket, 60 H.P., 440 volt, motor and controls, cables and blocks, etc.

OVERHEAD TRAVELING CRANES: 2—62' span, 10 tons capacity, three motors, 5, 10, and 12 H.P., 3 phase, 60 cycle, 440 volt. These Cranes are NEW. With or without runway and uprights.

CARS: 20 yd. and 30 yd., all steel, air dump, lift and drop door type.

CONVEYOR BELT: Large quantity of Goodrich SUPER LONG LIFE CORD CONVEYOR BELT, 42" wide, 6 ply, 42 oz. duck, 7/32" top cover, 1/16" bottom cover, on original reels, all NEW, NATURAL RUBBER, with or without mechanical parts.

JAW CRUSHERS: 10 x 20" to 48 x 60".

JAW CRUSHER—SPECIAL: Farrel 24 x 36" with or without motor and drive.

REDUCTION CRUSHERS: All sizes, Nordberg, Telsmith, Traylor, Allis Chalmers, etc.

DRYERS: Single shell 10' dia. x 90'60" long, complete with all equipment, offered with or without coal firing furnace, dust collector, etc.

1—Ruggles Coles double shell, class XF 12, 80" x 60'.

1—Traylor single 60" x 40' with or without motor.

MINE HOISTS: 1—All steel single drum 8 ft. dia., 1¼" rope, 64,000 lbs. single line pull, 600 FPM, 400 H.P., 2200 volts, A.C., with all control equipment.

1—350 H.P., single drum, 88" dia., 60" face.

1—250 H.P., single drum, 7'3" x5', 30,000 lbs. single line pull, 750 FPM, complete.

1—200 H.P., single drum, 42" face, 60" dia., A.C., 2200 volts and controls.

1—150 H.P., double drum, 38" dia., 42" face, 440 volts, A.C., complete with controls.

PULVERIZERS: Hardinge Conical Mills, 8' x 20", 8' x 30". 1—4' x 10' Rod or Ball Mill, all steel lined, heavy duty type.

SHOVELS AND DRAGLINES: Diesel and Electric, 1 yd. to 12 yd. capacity.

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Allis-Chalmers Continuous Steel Lined Ball Mill, 8' dia. x 7' long, complete with balls, drive and 250 HP motor.
Williams #1 Hammer Mill.
Hydroseal Slurry Pump, 4"x4".

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New—Never Used

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2—100 hp slip ring motors complete with starters.

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ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom Covers
48"	8	1/8" — 1/16"
42"	5	1/8" — 1/16"
36"	6	1/8" — 1/16"
30"	6	1/8" — 1/16"
30"	5	1/8" — 1/16"
26"	5	1/8" — 1/32"
24"	5	1/8" — 1/32"
24"	4	1/8" — 1/32"
20"	5	1/8" — 1/32"
20"	4	1/8" — 1/32"
18"	4	1/8" — 1/32"
16"	4	1/8" — 1/32"
14"	4	1/16" — 1/32"
12"	4	1/16" — 1/32"

Inquire For Prices — Mention Size and Lengths

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HEAVY-DUTY FRICTION SURFACE

	Width	Ply	Width	Ply	Width	Ply
Inquire For Prices — Mention Size and Lengths.	18"	6	10"	6	6"	5
	16"	6	10"	5	5"	5
	14"	6	8"	6	4"	5
	12"	6	8"	5	4"	4
	12"	5	6"	6	3"	4

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"A" Width All Sizes —
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Sold in Matched Sets.
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FIRE HOSE

APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

I.D. Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

AIR HOSE

I.D. Size	Length	per Length	Universal Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 Pair
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	50 "	15.00	1.50 Pair
1"	25 "	10.00	1.50 Pair
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LARGER SIZES ALSO AVAILABLE
All Prices—Net — F.O.B. New York

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I.D. Size	Length	per Length
¾"	25 feet	$4.25
	50 "	8.00
1"	25 "	6.25
	50 "	12.50
1¼"	25 "	7.50
	35 "	10.50
	40 "	12.00
	50 "	15.00
1½"	25 "	10.00
	35 "	14.00
	50 "	20.00

Each Length with Couplings Attached

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Rotary Kilns—6½' x 70' & smaller. One 9' x 170'.
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Stirtevant Rotary Gas crushers No. 0—No. 1—No. 1½ and No. 2.
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6—2" Wilfleys—Rubber Lined—Motorized.

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1—14", 20' centers, new belt, V-belted to 1½ HP Motor.
1—24", 15' centers, motorized.
1—30", 70' centers, motorized.
1—42", 20' centers, motorized.

SLUSHER HOIST
1—Ingersoll Rand, 3 drum, with built in AC Motor and 1½ yd. Crescent Scrapers.

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3—D-13000 Caterpillar Diesel Engines direct connected to 75 KW, 440 volt AC Generators.
1—D-4400 Caterpillar Diesel Power Unit, V-belted to 220 volt AC Generator.

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1—#64 Marcy.
1—6'x7' Allis Chalmers.

THICKENERS
1—20'x8' Dorr—Fir Tank.
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1—60"x22' Denver Simplex Cross-flow Classifier.
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1—4', 6-disc, Eimco Filters, with Vac. Equip.

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1—3'x6' Plat-O, Single Deck.
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15 spindle, simplex, with tilting arrangement, belt drive. Daily capacity 20 tons of 3 to 5% sulphide ore, or 7 tons of 20% sulphides. Also have 3 ball mills for sale.

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4" DISCHARGE HOSE

Complete with male and female couplings, 200-lbs. pressure, rubber-lined, in 50-ft. lengths. SALE PRICE:

USES
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$30.00
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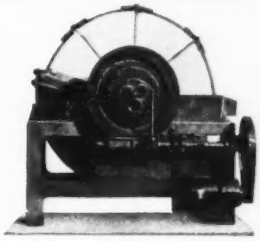

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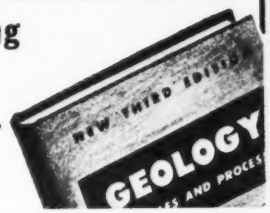

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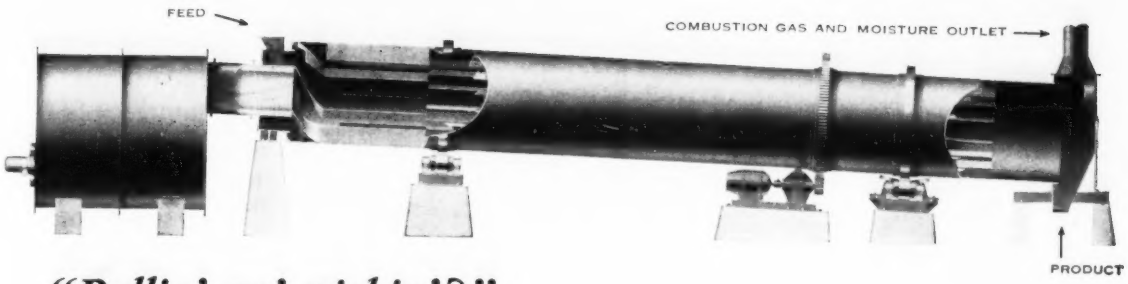

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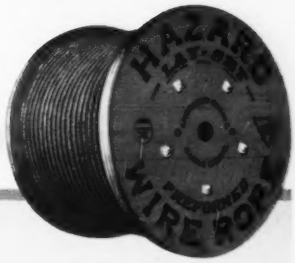

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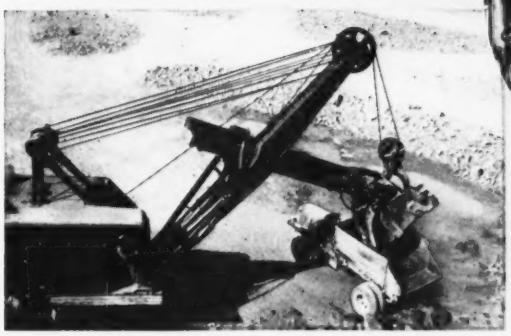

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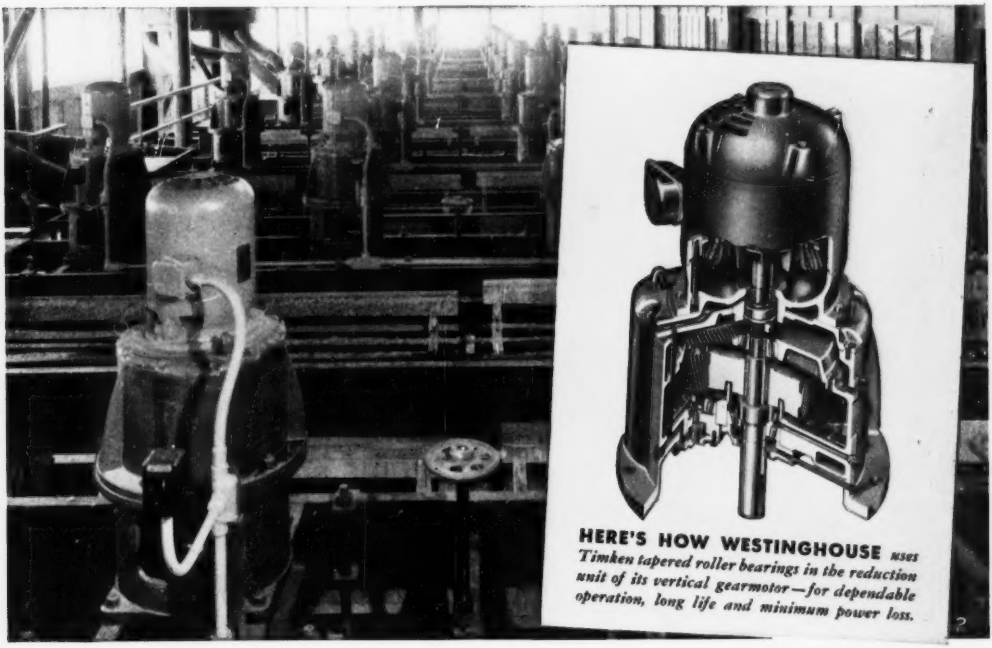

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